FINAL
Environmental Impact Statement

Rocky Mountain Laboratories

Hamilton, Montana

April 2004

National Institutes of Health

U.S. Department of Health and Human Services

FINAL
EIS

Integrated Research Facility
Rocky Mountain Laboratories

April 2004

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FINAL
ENVIRONMENTAL IMPACT STATEMENT

RML INTEGRATED RESEARCH FACILITY

National Institutes of Health

Ravalli County

Hamilton, Montana

April 2004

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Abstract

The National Institutes of Health (NIH) is considering constructing and operating an Integrated Research Facility at Rocky Mountain Laboratories (RML) in Hamilton, Montana. The Integrated Research Facility would include Biosafety Level - 4 (BSL-4) laboratories, in addition to BSL-3 and BSL-2 laboratories, animal rooms, offices, conference rooms, and break areas. The facility is needed to improve the nation's ability to study and combat emerging and re-emerging infectious disease and to protect public health in keeping with NIH's mission.

Two alternatives were considered in detail in the Final Environmental Impact Statement: the Proposed Action (build and operate the Integrated Research Facility), and No Action (continue current RML operations). Four additional alternatives were considered, but were eliminated from detailed study.

The agency's preferred alternative is the Proposed Action. The public comment period on the Final Environmental Impact Statement will close 30 days after the Notice of Availability appears in the Federal Register. Comments should be sent to Valerie Nottingham at the above address.

SUMMARY

INTRODUCTION

Rocky Mountain Laboratories' (RML) mission is to play a leading role in the nation's effort to develop diagnostics, vaccines, and therapeutics to combat emerging and re-emerging infectious diseases. Following events of September 11, 2001, and the anthrax attacks soon after, the public is aware of the potential for exposure of the civilian population to bioterrorism. President Bush and Congress directed the National Institute of Allergy and Infectious Diseases (NIAID) to increase its research into development of safe and effective measures to protect the public. These goals are commensurate with past and current research by NIAID. Research is needed to develop safe vaccines and drugs to prevent or cure infectious diseases. In response to this need for research directed at protecting public health, Congress authorized $66.5 million to NIAID for construction of a biosafety laboratory and related infrastructure (Public Law 107-117, January 10, 2002). NIAID has also developed a Strategic Plan for Biodefense Research and a research agenda for priority (Category A) biological agents, which is included as **Appendix A** (USDHHS 2000a, b).

A lack of available and adequate facilities is a major impediment to the study of organisms. As a result, many important pathogens have received little attention recently and many have not been examined using the tools of modern science. This research deficit becomes most apparent now when there has never been a greater demand for information on the pathogens and host responses to them. Information from basic research studies is critical for development of effective vaccines and therapies to combat infectious diseases. Such products can be developed only through understanding the basic biology of disease-causing agents. Cutting-edge discoveries in infectious disease research have resulted from NIAID programs and it is proposed to enhance the capability of the Institute to carry out basic research on important pathogens in this proposed facility. These enhanced capabilities, once in place, would have an additional benefit to the American public in that they would strengthen the Nation's ability to respond to outbreaks of naturally occurring diseases. Recent outbreaks of SARS and West Nile Fever underscore the need to have an extensive and flexible infrastructure to support infectious disease research to meet the challenge of emerging diseases.

NIAID has a history of research that has had global impacts on public health improvement. This research capability allows NIAID to address unknown, future health threats associated with emerging and re-emerging infectious disease. NIAID is comprised of both intramural and extramural research areas. The Division of Intramural Research (DIR) and the Vaccine Research Center (VRC) conduct intramural research. The DIR is located in laboratories on the main NIH campus in Bethesda, Maryland, the Twinbrook facilities in Rockville, Maryland, and at the Rocky Mountain Laboratories in Hamilton, Montana. DIR conducts research in virology, biochemistry, parasitology, epidemiology, mycology, molecular biology, immunology, immunopathology, and immunogenetics, and supports clinical, patient-centered research in allergy, immunology, and infectious diseases at NIH's Clinical Center (NIAID 2002a). NIAID supports extramural research, done by non-federal scientists in universities, medical schools, hospitals, and research institutions.

NIAID is one of 27 Institutes or Centers of NIH. NIH is one of 12 agencies of the U.S. Department of Health and Human Services.

As part of the expanded research program, NIH is proposing to construct an Integrated Research Facility and complete infrastructure upgrades to existing facilities at the RML campus in Hamilton. In the U.S., facilities to conduct research with pathogenic material at the highest level of containment are limited to Atlanta, Georgia; Frederick and Bethesda, Maryland; and San Antonio and Galveston, Texas.

PURPOSE OF AND NEED FOR ACTION

The purpose for the Proposed Action is to provide a highly contained and secure intramural laboratory at RML dedicated to studying the basic biology of agents of emerging and re-emerging diseases, some of which have potential as bioterrorism agents. Because of its traditional strengths in the area of infectious disease research and the federal funding parameters associated with NIAID's intramural laboratory program, the Integrated Research Facility is proposed to be located at RML in Hamilton, Montana.

In order to conduct necessary research to gain an understanding of pathogen and host response, specialized high-containment laboratories are required. The need for the Project (construction of the proposed Integrated Research Facility at RML) is based on the following aspects of the current facility at RML:

- RML is renowned for expertise in research on infectious microbes;
- Researchers at RML provide a core of unparalleled scientific knowledge uniquely qualified to develop strategies and products to counter emerging and re-emerging diseases;
- RML currently has BSL-2 and BSL-3 laboratories;
- Existing infrastructure at RML can efficiently and effectively provide a realistic, orderly, and comprehensive effort to safeguard the health of the American people through basic research as well as detection, investigation, control, and prevention of diseases.

Emergence of new diseases (e.g., HIV/AIDS, hantavirus pulmonary syndrome, West Nile fever, severe acute respiratory syndrome (SARS)) and re-emergence of drug-resistant pathogens (e.g., tuberculosis, malaria, *Staphylococci aureus*) are reminders that infectious diseases remain dominant features of national and international public health (USDHHS 1998; Fauci 2001). Societal, technological, and environmental factors (e.g., population growth, poverty, ease of travel, alteration of habitats) facilitate occurrence and spread of disease. A critical need exists for continued research, not only on new diseases, but also on old and familiar ones.

SUMMARY OF PROPOSED ACTION

NIH proposes to construct an Integrated Research Facility to house Biosafety Level (BSL)-2, BSL-3, and BSL-4 laboratories, animal research facilities, administrative support offices, conference rooms, and break areas at the RML Facility in Hamilton, Montana. The Proposed Action would encompass approximately 105,000 square feet of building constructed within the existing 33-acre RML campus in the southwest portion of Hamilton.

The Integrated Research Facility and research programs would require additions and upgrades to the existing RML campus. Upgrades would include:

- A new chilled water plant and emergency power backup system;
- A new addition to Boiler Building 26 to house a new natural gas-fired boiler; and
- Construction of below grade systems and utility distribution tunnels to service the Integrated Research Facility.

Research at the RML site would include pathogenesis, immune response, vaccine, diagnostics and therapeutics work and will focus on RML's strength in vector-borne pathogen research. RML does not and will not conduct research to develop offensive biological weapons.

Biosafety Level 4 (BSL-4)

A BSL-4 laboratory would be constructed within the Integrated Research Facility to provide the highest possible level of protection for scientists and the public and to expand the research capability of RML. The use of a BSL-4 laboratory would be required for research of certain agents and experiments, such as testing of vaccines for emerging and re-emerging infectious microbial agents that are normally ranked at BSL-3 level. Stringent safeguards, including engineering and design features (see Appendix E) are required for BSL-3 and BSL-4 laboratory facilities to prevent pathogens from escaping into the environment. In addition, the BSL-4 laboratory would be designed to prevent contact between pathogens and people inside the workspace and provide secure storage for infectious agents.

The BSL-4 laboratory would be located within the central core of the building, surrounded by a buffer corridor between the laboratory and the exterior. A specific facility operations manual would be prepared and adopted prior to operation of the laboratory.

PROJECT ALTERNATIVES

Alternatives were identified during the public scoping process or by RML during review and analysis of the Proposed Action. The following alternatives were considered technically infeasible, provided no environmental advantage over the Proposed Action or No Action, or did not meet the purpose and need:

- Build the Integrated Research Facility in Bethesda, Maryland
- Relocate Rocky Mountain Laboratories to a Less Populated Area
- Construct the Integrated Research Facility at Alternate Location
- Construct and administer the Integrated Research Facility by another agency, or at another NIH Location

The only alternative to the Proposed Action discussed in detail in this EIS is the No Action Alternative. Under the No Action Alternative, the Proposed Action would not be implemented at RML. Existing operations at RML would be maintained and operated at current levels.

SUMMARY OF IMPACTS

Analysis of potential impacts and mitigation measures associated with the Proposed Action and Alternatives is presented in Chapter 4 – *Environmental Consequences.* The following is a summary of potential impacts resulting from the Proposed Action and No Action Alternative.

SOCIAL RESOURCES

Proposed Action

Additional employment associated with the proposed Integrated Research Facility includes up to 200 workers at the peak of construction and about 100 employees in late 2005/early 2006 when the facility would be opened. Based on the Ravalli County rate of 2.45 persons per household, this would add a total of 245 new residents to the county. This represents between 1.4 percent and 3 percent of all new residents projected for the County, based on estimates in the Ravalli County Economic Needs Assessment (Swanson, 2002). Addition of new homes would result in increased business for homebuilders and real estate developers. School capacity is adequate for new growth, but operating and maintenance costs would increase to accommodate the new students. No impact is expected on the ethnic or gender make-up of the population.

Traffic around the RML associated with construction, delivery of equipment and materials would increase over the 2-year construction period. Following construction, traffic levels would likely remain elevated due to the 100 new permanent employees at RML (approximately 20 percent during peak hours), although large truck traffic to support RML would return to current levels.

No Action Alternative

Under the No Action Alternative, population growth and housing starts would likely continue at the current pace. Current levels of community services, programs, and infrastructure would not change. Current levels of traffic would continue in the neighborhood adjoining RML. Research on agents at the BSL-2 and BSL-3 level would continue.

COMMUNITY RISK

Proposed Action

Redundancy of safety equipment and procedures, operational safeguards, and monitoring systems inherent to biosafety laboratories reduce the risk of an accidental release. Theoretically, human error or multiple, simultaneous mechanical failures could lead to accidental release of biological materials from a biosafety laboratory. The overall safety record of biomedical and microbiological laboratories also indicates that there is not a risk of accidental release. Nevertheless, in order to address community safety concerns, the NIH applied both qualitative and quantitative risk assessment strategies to investigate potential community impacts of the proposed Integrated Research Facility at the RML. The qualitative assessment included a literature review regarding laboratory acquired infections; a review of all infectious disease research protocols performed by the NIAID requiring BSL-2 with BSL-3 practices, BSL-3, or BSL-4 facilities for the past two decades; review of all NIAID accidents associated with these laboratories; injuries and illnesses during the same period of time; review of RML medical waste incinerator operations, infectious waste handling procedures, animal containment, and procedures for biological material shipment. Additionally, a survey was conducted to determine the safety records of BSL-4 laboratories worldwide with 20 or more years of operating experience. Additionally, the NIH performed a quantitative assessment of risk with regard to infectious agent release to the surrounding Hamilton community from the proposed BSL-4 Integrated Research Facility at RML. The quantitative risk assessment was driven by reasonably foreseeable, credible threat scenarios and addressed spills and work disruption; safety system operation and potential failures; and fire and explosion. The modeling tool used to perform these analyses is the Maximum Possible Risk (MPR) model developed by the NIH. Anthrax, in spore form, was chosen as the worst-case scenario agent based on public health impact and dissemination potential (Rotz *et. al.* 2002).

Qualitative and quantitative risk analysis revealed that the potential risk to the community surrounding the Rocky Mountain Laboratories and specifically the IRF from potential release of infectious agents is negligible.

No Action Alternative

Under the no action alternative, human error or multiple, simultaneous mechanical failures could lead to accidental release of biological materials from the existing RML facilities. However, safety equipment and procedures, operational safeguards, and monitoring systems inherent to biosafety labs significantly reduce the risk of accidental release. The overall safety record of biomedical and microbiological laboratories indicates that there is not a significant risk of accidental release. Therefore, the potential risk to the community surrounding the Rocky Mountain Laboratories from the existing laboratories in which infectious disease research is currently conducted is negligible.

ECONOMIC RESOURCES

Proposed Action

The Proposed Action would have direct economic impacts on both the City of Hamilton and Ravalli County throughout construction and operation. Payroll associated with construction of the Integrated Research Facility is estimated at $4.7 million. Using the current economic multiplier in the 2002 Ravalli County Needs Assessment, approximately $18.9 million in economic activity would be gained in the 2-year construction period.

Annual payroll for 100 new employees is estimated at $6.6 million. Added to the current $10.4 million annual payroll, RML would contribute $17 million annually to the local economy. The RML and the proposed Integrated Research Facility meet community goals listed in the 2002 Ravalli County Economic Needs Assessment, Ravalli County Growth Policy, and the City of Hamilton Comprehensive Master Plan.

Public finance revenues would increase from income tax on the Integrated Research Facility-related construction and operations payrolls, as well as income of spouses and older children of the additional RML employees, increased number of licensed vehicles, and property tax revenues based on additional new homes and property assessments.

No Action

Selection of the No Action alternative would not have direct economic impacts. An opportunity to stabilize the local economy with government jobs and increased tax revenue would be lost, slowing the realization of economic development goals of the city and county.

NOISE

Proposed Action

Additional noise producing equipment would be associated with construction of the Integrated Research Facility. With specified noise reduction measures, the Integrated Research Facility would meet RML's 2003 noise guidelines. Reasonably foreseeable action and recently implemented noise reduction features have and would reduce noise further.

No Action

There would be no change in the noise level from not implementing the Proposed Action. Periodic noise measurements will be taken by an independent professional acoustic contractor to evaluate compliance with the voluntary guidelines. In the event that noise levels exceed the guidelines, funding will be sought to institute remedial measures. Reasonably foreseeable action and recently implemented noise reduction features have and would reduce noise further.

VISUAL QUALITY

Proposed Action

The primary visual impact of the Proposed Action would be the addition of a large building into an area of existing buildings. Existing and proposed stacks associated with the Boiler Plant would create vertical linear contrast to surrounding structures. Ventilation stacks on the Integrated Research Facility would not be visible from off the campus. Proposed landscaping around the Integrated Research Facility would have a positive impact on visual quality in the neighborhood.

No Action

There would be no change in existing visual condition under the No Action Alternative. The site is vegetated with scrub grasses and weeds. There are also dirt/gravel roadways and areas of deteriorating asphalt. A variety of outside clutter and covered storage is visible but could be removed to improve facility aesthetics.

HISTORICAL RESOURCES

Proposed Action

The Proposed Action would be partially visible from the RML Historic District. The Integrated Research Facility could affect the view from the historic district, but there would be no adverse effect on the qualities inherent in the Historic District.

No Action

Selection of the No Action Alternative would have no effect on the existing historic district.

AIR QUALITY

Proposed Action

Gaseous and particulate air contaminant emissions would be generated during normal laboratory operations. Source emissions would comply with all air quality standards. Use of the incinerator to dispose of refuse generated at the facility, including those from the Integrated Research Facility, would increase from 2-3 days/week to 3-4 days/week. Permit limits (Montana Air Quality Permit 2991-04) on the incinerator would not be exceeded.

No Action

Emissions from RML would remain at current levels under the No Action Alternative.

WATER SUPPLY AND WASTEWATER

Proposed Action

The estimated increase in water use of 17,000 gallons per day represents about a 1 percent increase in the amount of water pumped by the City of Hamilton Department of Public Works (CHDPW) on a daily basis. With respect to available capacity, the Integrated Research Facility would use about 5.3 percent (12 gpm of 226 gpm) of system capacity. Increased demand for water created by operation of the Integrated Research Facility would have a minor impact on the CHDPW municipal water supply system, and the system would be able to handle the increased demand.

Approximately 1,000 to 1,200 pounds of solids per day are currently handled at the CHDPW. (Lowry 2003). The Integrated Research Facility would generate an estimated 28 pounds of additional solids, representing a 2.3 to 2.8 percent increase in solids load to the CHDPW wastewater facility.

The Proposed Action would not have an impact on the solids handling capacity at the CHDPW because the planned upgrade of the solids handling capacity at the facility would accommodate current and future needs of Hamilton as well as additional solids produced by the Integrated Research Facility.

No Action

Selection of the No Action Alternative would have no adverse affects on the Hamilton water supply and wastewater treatment systems.

CUMULATIVE EFFECTS

Cumulative effects on the environment resulting from past, present and reasonably foreseeable actions (NIH, other organizations, growth), along with construction of the Integrated Research Facility would include an increase in area traffic, increased demand on community services and programs, increased water use and demand on CHDPW water and sewage treatment systems, and population growth in the Bitterroot Valley. Increased payroll would benefit the local economy and tax revenue from income and property assessments would benefit local and state government. These effects may be compounded by the expansion of Corixa, Inc. and growth projected in Hamilton.

PREFERRED ALTERNATIVE

The NIH has identified the Proposed Action as the preferred alternative.

Table of Contents

List of Tables

List of Figures

List of Appendices

CHAPTER 1
PURPOSE AND NEED

1.1 BACKGROUND

Rocky Mountain Laboratories' (RML) mission is to play a leading role in the nation's effort to develop diagnostics, vaccines, and therapeutics to combat emerging and re-emerging infectious diseases. Following events of September 11, 2001, and the anthrax attacks soon after, the public is aware of the potential for exposure of the civilian population to bioterrorism. President Bush and Congress directed the National Institute of Allergy and Infectious Diseases (NIAID) to increase its research into development of safe and effective measures to protect the public. These goals are commensurate with past and current research by NIAID. Research is needed to develop safe vaccines and drugs to prevent or cure infectious diseases. In response to this need for research directed at protecting public health, Congress authorized $66.5 million to NIAID for construction of a biosafety laboratory and related infrastructure (Public Law 107-117, January 10, 2002). NIAID has also developed a *Strategic Plan for Biodefense Research* and a research agenda for priority (Category A) biological agents, which is included as **Appendix A** (USDHHS 2000a, b).

A lack of available and adequate facilities is a major impediment to the study of organisms. As a result, many important pathogens have received little attention recently, and many have not been examined using the tools of modern science. This research deficit becomes most apparent now when there has never been a greater demand for information on the pathogens and host responses to them. Information from basic research studies is critical for development of effective vaccines and therapies to combat infectious diseases. Such products can be developed only through understanding the basic biology of disease-causing agents. Cutting-edge discoveries in infectious disease research have resulted from NIAID programs. It is proposed to enhance the capability of the Institute to carry out basic research on important pathogens in this proposed facility. These enhanced capabilities, once in place, would have an additional benefit to the American public in that they would strengthen the nation's ability to respond to outbreaks of naturally occurring diseases. Recent outbreaks of SARS and West Nile Fever underscore the need to have an extensive and flexible infrastructure to support infectious disease research to meet the challenge of emerging diseases.

NIAID has a history of research that has had global impacts on public health improvement. This research capability allows NIAID to address unknown, future health threats associated with emerging and re-emerging infectious disease. NIAID is comprised of both intramural and extramural research areas. The Division of Intramural Research (DIR) and the Vaccine Research Center conduct intramural research. The DIR is located in laboratories on the main NIH campus in Bethesda, Maryland; the Twinbrook facilities in Rockville, Maryland; and the Rocky Mountain Laboratories in Hamilton, Montana. DIR conducts research in virology, biochemistry, parasitology, epidemiology, mycology, molecular biology, immunology, immunopathology, and immunogenetics, and supports clinical, patient-centered research in allergy, immunology, and infectious diseases at National Institutes of Health's (NIH) Clinical Center (NIAID 2002a). NIAID supports extramural research, done by non-federal scientists in universities, medical schools, hospitals and research institutions.

NIAID is one of 27 institutes or centers of NIH. NIH is one of 12 agencies of the U.S. Department of Health and Human Services.

RML does not and will not work on or develop biological weapons, as this is forbidden by a national security directive and international law. President Nixon, in 1969, agreed to a National Security Decision Memorandum (35), which renounced use of lethal methods of bacteriological/biological warfare and ordered destruction of all stockpiled agents. The U.S. signed the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction, which became effective March 26, 1975 (signed by President Ford and ratified by Congress), which remains in effect today. The U.S. government maintains the position that there is no justification, including retaliation, for offensive biological weapons research or use.

As part of the expanded research program, NIH is proposing to construct an Integrated Research Facility and complete infrastructure upgrades to existing facilities at the RML campus in Hamilton (**Figure 1-1**). In the U.S., facilities to conduct research with pathogenic material at the highest level of containment are limited to Atlanta, Georgia; Frederick and Bethesda, Maryland; and San Antonio and Galveston, Texas.

Public participants have expressed concern over installation of the proposed Integrated Research Facility and potential risks of biological and infectious agents to be studied. This Final Environmental Impact Statement (FEIS) analyzes potential impacts associated with the proposed Integrated Research Facility as required by the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. § 4321 *et seq.*), and U.S. Department of Health and Human Services General Administration Manual Part 30: Environmental Protection. This document follows the Council on Environmental Quality's regulations for implementing procedural provisions of NEPA (40 CFR Parts 1500-1508).

1.1.1 Organization of the Document

Chapter 1 – Purpose and Need. This chapter explains the purpose and need for the Proposed Action. It also includes a summary of public comment and how issues raised during public scoping were used.

Chapter 2 – Proposed Action and Alternatives. This chapter discusses in more detail alternatives considered in the EIS and compares them.

Chapter 3 – Affected Environment. This chapter explains the current condition of resources that may be affected by the Proposed Action. Resources that would not be affected are identified and rationale provided as to why they will not be discussed further.

Chapter 4 - Environmental Consequences. This chapter discloses potential effects of alternatives, including direct, indirect, and cumulative effects.

Chapter 5 - Response to Comments. This chapter contains a copy of all comments received on the SDEIS along with NIH's response to substantive comments.

Appendix A - Strategic Plan for Biodefense Research.

Appendix B - Characteristics of Diseases Studied at RML.

Appendix C - Transportation of Agents.

Appendix D - Review of Biocontainment Laboratory Safety Record.

Appendix E - Standard Operating Procedures for a BSL-4 Facility.

1.1.2 Required Disclosures

In accordance with section 40 CFR 1502.16 (Regulations Implementing the Procedural Provisions of NEPA), the following list details the required disclosures and where they can be found:

- Direct and indirect effects and their significance (Chapter 4);
- Potential conflicts between the Proposed Action and objectives of federal, state, and local land use plans, policies, and controls (Chapter 1);
- Potential environmental effects of alternatives (Chapter 4);
- Energy requirements and conservation potential and mitigation measures (Chapter 2 – Proposed Action);
- Natural and depletable resource requirements, conservation potential, and mitigation measures (Chapter 2 – Proposed Action);
- Urban quality, historic and cultural resources, and design of the built environment (Chapter 3 and Chapter 4 – Historic Resources); and
- Means to mitigate adverse environmental impacts (Chapter 4).

1.2 HISTORY OF ROCKY MOUNTAIN LABORATORIES

RML is located in Hamilton, Montana, approximately 50 miles south of Missoula, in Ravalli County. Hamilton has a population of approximately 3,700 and is located in the center of western Montana's Bitterroot Valley. RML is located east of the Bitterroot River in the southwest portion of Hamilton (**Figure 1-1**).

Infectious diseases are the second leading cause of death worldwide (WHO 2000) and rank third in the United States (Armstrong *et al.* 1999). NIAID, through work at the RML facility, "conducts and supports research that strives to understand, treat, and ultimately prevent the myriad of infectious, immunologic, and allergic diseases that threaten millions of human lives" (USDHHS 2000a). NIAID has a history of research that has had global impacts on public health improvement, which allows it to address unknown, future health threats associated with emerging and re-emerging infectious disease.

RML began in 1902 as a camp that served as a research laboratory. The researchers found that ticks transmitted Rocky Mountain spotted fever. During the 1920s, ticks were ground up to make a vaccine for this disease at RML.

After successful work with spotted fever, RML expanded its facilities and programs in the 1930s and 1940s to work on other insect-borne diseases, including yellow fever and spirochetal relapsing fevers. In the 1940s, scientists made vaccines (in buildings that are part of RML's current complex) that protected troops against typhus and yellow fever during World War II.

In 1948, RML and the Biologics Control Laboratory joined the Division of Infectious Diseases of the NIH to form the National Microbiological Institute. Six years later, Congress gave the institute its present name, NIAID, to reflect inclusion of allergy and immunology research.

In 1979, the laboratory was renamed Rocky Mountain Laboratories because it consisted of multiple laboratories and branches. The current organizational structure consists of the Laboratory of Persistent Viral Diseases, Laboratory of Human Bacterial Pathogenesis, Laboratory of Intracellular Parasites, Rocky Mountain Veterinary Branch, and the Administrative and Facilities Management Section (USDHHS 2002a).

In 1982, the agent that causes Lyme disease, also transmitted by ticks, was identified at RML. Today, scientists at RML are investigating infectious diseases including Rocky Mountain spotted fever, chlamydia, HIV/AIDS, Q fever, tuberculosis, plague, Lyme disease, salmonella (typhoid fever), and transmissible spongiform encephalopathies (e.g., sheep scrapie and mad-cow disease).

1.3 ELEMENTS OF BIOSAFETY CONTAINMENT

The three elements of containment in biosafety laboratories are laboratory practice and technique, safety equipment, and facility design. The pathogen, health hazard, and research purpose (e.g., tissue culture, vaccine production) determine the elements of containment necessary (USDHHS 1999). Biosafety levels are combinations of these elements (**Table 1-1**).

While certain biological agents may require a given biosafety level (e.g., syphilis is BSL-2 for all procedures), the recommended biosafety level may vary by agent and type of research. An example using hantavirus helps to illustrate this point.

Hantaviruses are Category C biological agents according to U.S. Department of Health and Human Services (USDHHS 1998). Category C agents are emerging pathogens that could be engineered for mass dissemination in the future because they are available, easy to produce and disseminate, and have potential for high mortality rates and major health impacts. Hantavirus pulmonary syndrome is an emerging disease. According to biosafety standards (USDHHS 1999), BSL-2 practices and procedures are recommended for laboratory handling of sera with potential infections of hantavirus pulmonary syndrome. Use of a certified biological safety cabinet (BSC) is recommended for handling human body fluids when potential exists for spillage or aerosol. Potentially infected tissue samples are handled in BSL-2 facilities following BSL-3 practices and procedures. Cell-culture virus propagation is carried out in a BSL-3 facility following BSL-3 practices and procedures. Preparation and handling of viral concentrates is performed in BSL-4 containment facilities. Therefore, appropriate biosafety levels and the agent and type of research determine which procedures are to be used. Additional operational procedures may be implemented based on experience.

1.4 PURPOSE AND NEED FOR ACTION

The purpose for the Proposed Action (described in detail beginning on page 2-1) is to provide a highly contained and secure intramural laboratory at RML dedicated to studying the basic biology of agents of emerging and re-emerging diseases, some of which have potential as bioterrorism agents. Because of its traditional strengths in the area of infectious disease research and the federal funding parameters associated with NIAID's intramural laboratory program, the Integrated Research Facility is proposed to be located at RML in Hamilton, Montana.

To protect citizens of the U.S., the public health system and primary healthcare providers must be prepared to address these various biological

Table 1-1.
Summary of Recommended Biosafety Levels for Infectious Agents

BSL	Agents	Practices	Safety Equipment (Primary Barriers)	Facilities (Secondary Barriers)
1	Not known to consistently cause disease in healthy adults	Standard microbiological practices	None required	Open bench-top sink required
2	Associated with human disease, hazards are percutaneous injury, ingestion, mucous membrane exposure	BSL-1 practice plus: • Limited access • Biohazard warning signs • "Sharps" precautions • Biosafety manual defining any needed waste decontamination or medical surveillance policies	Primary barriers are Class I or II BSCs or other physical containment devices used for all manipulations of agents that cause splashes or aerosols of infectious materials; PPE are laboratory coats, gloves, and face protection as needed	BSL-1 plus: Autoclave available Directional airflow into laboratory
3	Indigenous or exotic agents with potential for aerosol transmission; disease may have serious or lethal consequences	BSL-2 practice plus: • Controlled access • Decontamination of all waste • Decontamination of lab clothing before laundering • Baseline serum	Primary barriers are Class I or II BSCs or other physical containment devices used for all open manipulations of agents; PPE are protective lab clothing, gloves, respiratory protection as needed, and solid front gowns	BSL-2 plus: • Physical separation from access corridors • Self-closing, double-door access • Exhausted air not recirculated • Negative airflow into laboratory
4	Dangerous/exotic agents which pose high risk of life-threatening disease, aerosol-transmitted lab infections; or related agents with unknown risk of transmission	BSL-3 practices plus: • Clothing change before entering • Shower on exit • All material decontaminated on exit from facility	<u>Cabinet Laboratory</u> All procedures conducted in Class III BSC; workers not in full-body, air-supplied, positive pressure suit <u>Suit Laboratory</u> Procedures conducted in suit lab area in combination with Class I or Class II BSCs; Workers in full-body, air-supplied, positive pressure suit	BSL-3 plus: • Separate building or isolated zone • Dedicated supply and exhaust, vacuum, and decontamination systems • Other requirements outlined in the text

BSL = Biosafety Level
BSC = Biological Safety Cabinet
PPE = Personal Protective Equipment.
Source: USDHHS 1999.

agents, including rarely seen pathogens. Research plays a major role in developing techniques for identifying and characterizing biological agents. Also, several of the "critical biological agents" identified in the Centers for Disease Control and Prevention's (CDC) strategic plan are listed as priority emerging or re-emerging diseases in CDC's strategy for preventing emerging infectious diseases (USDHHS 1998).

The goal of successful preparation for the threat of diseases depends in large measure on availability of effective diagnostic tests, vaccines, and therapeutic drugs. Information from basic research studies is critical for development of effective vaccines and therapies to strengthen the response to outbreaks. Effective vaccines and therapies can be developed only through understanding the basic biology of disease-causing agents.

The President's budget for 2003 devotes funds to NIAID for basic and applied research, including funds designated specifically for construction of intramural facilities.

NIAID has developed a research agenda for Category A agents (USDHHS 2002b). Category A agents are easily transmitted from person to person, have high mortality rates, may have major public health impacts, might cause public panic and social disruption, and require special action for public health preparedness. The research agenda emphasizes the following five interrelated areas:

- Basic biology and disease-causing mechanisms;
- Host immune response;
- New and improved vaccines;
- New and improved treatments against new and drug-resistant agents; and
- New techniques for rapidly and accurately identifying the disease agent.

In order to conduct necessary research to gain an understanding of pathogen and host response, specialized high-containment laboratories are required. Building upon available expertise is required for a response in a timely fashion. The need for the Project (construction of the proposed Integrated Research Facility at RML) is based on the following aspects of the current facility at RML:

- RML is renowned for expertise in research on infectious microbes;
- Researchers at RML provide a core of unparalleled scientific knowledge uniquely qualified to develop strategies and products to counter emerging and re-emerging diseases;
- RML currently has BSL-2 and BSL-3 laboratories;
- Existing infrastructure at RML can efficiently and effectively provide a realistic, orderly, and comprehensive effort to safeguard the health of the American people through basic research as well as detection, investigation, control, and prevention of diseases.

Emergence of new diseases (e.g., HIV/AIDS, hantavirus pulmonary syndrome, severe acute respiratory syndrome (SARS), West Nile fever) and re-emergence of drug-resistant pathogens (e.g., tuberculosis, malaria, *Staphylococci aureus*) are reminders that infectious diseases remain dominant features of national and international public health (USDHHS 1998; Fauci 2001). Societal, technological, and environmental factors (e.g., population growth, poverty, ease of travel, alteration of habitats) facilitate occurrence and spread of disease. A critical need exists for continued research, not only on new diseases, but also on old and familiar ones.

A lack of available and adequate facilities is a major reason that study of these organisms has received little attention in the recent past. There has never been a greater demand for basic information on pathogens and host responses for development of effective vaccines and therapies. Such information can be developed only through understanding of the basic biology of disease-causing agents in laboratories designed with the highest safety precautions (BSL-4).

1.5 SCOPE

The scope of the Project is established by the purpose and need and by U.S. Department of Health and Human Services (USDHHS) procedures and authority. The scope (40 CFR 1508.25) consists of the range of actions, alternatives, environmental issues, and impacts to be considered and discussed in the EIS.

1.5.1 Impacts

Regulations contained in 40 CFR 1508.25[c] require analysis of direct, indirect, and cumulative impacts. Direct impacts are caused by the action and occur at the same time and place. Indirect impacts are caused by the action and occur later in time or farther removed in distance, but they are still reasonably foreseeable. Cumulative impacts result from incremental impact of the action when added to other past, present, and reasonably foreseeable future actions.

1.5.2 Alternatives

In determining the scope of analysis, NIH must consider three types of alternatives (40 CFR 1508.25[b]): no action, other reasonable courses of action, and mitigation measures. Other reasonable courses of action include alternatives that meet the stated purpose and need and, in this case, are within the available budget. Alternatives are discussed in Chapter 2. Impacts of the No Action Alternative, which would maintain the current operations, are also considered.

1.5.3 Connected, Cumulative, and Similar Actions

The Code of Federal Regulations (40 CFR 1508.25) addresses the scope of analysis and elements to be considered in a Proposed Action. The regulations recognize that separate activities can combine and interact to create impacts that *may be significantly beyond* the effects of individual actions. These actions are considered *cumulative*, and their additive effects must be addressed in the analysis.

Federal regulations also require a combined analysis of *connected* actions. Connected actions are closely related and 1) automatically trigger other actions, 2) could not or would not proceed unless other actions are taken previously or simultaneously, and 3) are interdependent parts of a larger action and depend on the larger action for their justification. The effects of connected actions should be analyzed together. *Similar* actions are those that share a common timing or geography and are evaluated together.

1.5.4 Decision To Be Made

Based on the environmental analysis and consideration of public comments on the Proposed Action, NIH will decide:

- Whether to construct an Integrated Research Facility including a Biosafety Level 4 laboratory at RML;
- Whether upgrades to existing infrastructure included in the Proposed Action would be accomplished; and
- What mitigation and monitoring measures (if any) would be required.

The scope of the Project is confined to issues and potential environmental consequences relevant to the decision. The decision is subject to direction from higher levels. Other agencies with regulatory authority are shown in **Table 1-2**.

The Council on Environmental Quality regulations implementing NEPA require consideration of environmental effects and prescribe mitigation where practical to limit those effects. Reconsideration of other existing NIH/RML decisions or programmatically prescribing mitigation or standards for future NIH/RML activities is beyond the scope of this document.

1.6 PUBLIC SCOPING

A Notice of Intent to prepare an EIS was published in the Federal Register on October 4, 2002. Publication of this notice initiated a 30-day public scoping period that provided for acceptance of comments through November 4, 2002. NIH allowed an additional two weeks for comments, through November 18, 2002. A public scoping meeting was held in Hamilton on October 21, 2002. About 100 people attended that meeting.

NIH published and distributed the draft EIS (DEIS) for the proposed Integrated Research Facility in May 2003. A Notice of Availability was published in the Federal Register on May 23, 2003, which initiated a 60-day public comment period on the DEIS ending on July 21, 2003. A public meeting was held on June 26, 2003, to solicit comments from the public on the DEIS. Approximately 200 people attended the public meeting, at which 31 people provided verbal comments.

Table 1-2.
Regulatory Responsibilities

Authorizing Action	Regulatory Agency
Air Quality Permit	Montana Department of Environmental Quality (MDEQ)
Emergency Response	MDEQ, the Department of Military Affairs, Disaster and Emergency Services Division, and Occupational Safety and Health Administration (OSHA)
National Environmental Policy Act	U.S. Environmental Protection Agency (USEPA), U.S. Department of Health and Human Services (USDHHS), and Council on Environmental Quality
National Historic Preservation Act	State Historic Preservation Office (SHPO)
Infectious and Hazardous Material/Waste Management	MDEQ and OSHA
Transport of Hazardous Material (Wastes)	U.S. Department of Transportation, Federal Aviation Administration, International Air Transportation Association (IATA), MDEQ
Construction Safety	OSHA
Emergency Planning and Community Right-to-Know Act (EPCRA)	USEPA (Region 8)
Safe Drinking Water Act	MDEQ and the City of Hamilton
Radioactive Materials	Nuclear Regulatory Commission

One hundred twenty-two letters, emails, faxes, and comment forms were submitted from 114 separate groups, individuals, and government agencies during the comment period. In response to the comments received by NIH on the DEIS, NIH determined that a supplemental DEIS (SDEIS) would be prepared and submitted to the public for review.

1.6.1 Community Liaison Group Meetings

Regular Community Liaison Group meetings are held at the RML campus to provide a forum for discussion of public issues and concerns about RML. The Community Liaison Group consists of 25 key community stakeholders, including, but not limited to, representatives from local government (mayor of Hamilton and Ravalli County commissioners), advocacy groups, realtors, natural resource agencies, local residents, and emergency response agencies. Members of the Community Liaison Group are encouraged to bring questions and concerns to the meetings for open discussion.

1.6.2 Open House Public Meetings

NIH has held two open house public meetings where citizens expressed their concerns and questions to specialists in biosafety, biosecurity, and disease. One meeting was held before release of the DEIS. One was held after release of the DEIS to take comment on the DEIS. Another public meeting was held January 22, 2004, to take comment on the supplement draft environmental impact statement.

1.6.3 Needs Assessment

As additional public outreach, NIH held informal meetings with people who commented during scoping and with other key community stakeholders in February 2003. The objectives of the "needs assessment" were to provide an opportunity for these people to voice their concerns. Information gathered in the needs assessment was used to develop the Proposed Action, describe the affected environment, determine effects, and help identify reasonably foreseeable actions.

1.6.4 DEIS Comment Period

The comment period on the DEIS began on May 23, 2003, with the Notice of Availability that appeared in the Federal Register. Agencies and people who had submitted written comments at scoping, as well as those who requested it, were provided a copy of the DEIS. The DEIS was posted on the Internet and distributed to local libraries. The comment period ended July 21, 2003. Comments on the DEIS were considered as scoping comments for compilation of the SDEIS.

Comments on the DEIS are summarized and used as described in Section 1.7 below.

1.6.5 SDEIS Comment Period

A public comment period followed the SDEIS. The comment period opened on December 29, 2003, with the notice of availability in the Federal Register. The comment period was 45 days and closed on February 11, 2004. Comments on the SDEIS are included in their entirety in Chapter 5, along with responses.

1.7 IDENTIFICATION OF ISSUES

Five hundred eighty-eight (588) public comments were received during scoping in 103 separate documents (letters, e-mails, phone calls, comment forms). Approximately 10 percent of the comments focused on a need for additional alternatives, six percent identified potential mitigation measures, 60 percent related to issues that could be addressed through effects analyses, and 20 percent were considered to be outside the scope of the EIS. Statements in favor or not in favor of the Project were in 12 comments. Sixteen comments could not be categorized.

Issues identified in the comments were assigned to the following four categories:

- Issue or concern that could develop an alternative;
- Issue or concern that could result in a mitigation measure;
- Issue or concern that could be addressed by effects analysis; and
- Issue or concern outside the scope of the EIS.

A list of issues raised by the public with respect to alternatives, mitigation measures, and the analyses to be completed in the EIS is provided below. There were no unresolved conflicts identified with the Proposed Action that were not addressed by the No Action Alternative.

1.7.1 Alternative Development Comments

Key public scoping comments made concerning alternative development included:

- Requests to construct the Integrated Research Facility in a less populated area, at a more secure facility such as a military installation, or at the NIH campus in Bethesda, MD. These comments are addressed through Alternatives Considered but Eliminated from Detailed Study (Section 2.2.2) on page 2-17.
- Request for more information as to how and why RML was selected overall and given the potential risk to the community through disease outbreaks or increased terrorism. This is addressed in Purpose and Need (Section 1.4), in the Community Safety and Risk section on page 4-5 and in **Appendix B**.
- Comments that a BSL-4 laboratory should not be built, regardless of location. Some people voicing this concern believed that more BSL-4 laboratories would increase the probability of unintentional outbreak through releases, sabotage, or terrorism. This is addressed in the No Action Alternative.

Additional comments on the DEIS related to alternatives considered include:

- Request for additional information about the project, including laboratory equipment used, testing procedures, energy consumption of the Integrated Research Facility, and more details regarding budget and finances. This information is found in the EIS within Sections 2.2 (Proposed Action) and 2.2.1 (No Action Alternative) and **Appendix E** (Standard Operating Procedures of a BSL-4 Laboratory).
- No alternatives besides the No Action Alternative were considered. The rationale for the alternatives considered is presented in Section 2.2.2 of the EIS. Additional information has been included in the Purpose and Need (Section 1.4).
- Information on training opportunities for local emergency providers and requirements for training of laboratory workers has been included in **Appendix E** (Standard Operating Procedures for a BSL-4 Laboratory).
- Animals used for experiments. More information on the care and use of animals has been included in Section 2.1.4.1 beginning on page 2-10.

Additional comments on the SDEIS related to alternatives include:

- Disposal of prions. More information on the disposal of prion-contaminated materials is included in the FEIS.

1.7.2 Mitigation Measures

Potential mitigation measures raised by those individuals providing comments during scoping include:

- Adoption of pollution prevention strategies to avoid or reduce the amount of pollution generated at the facility. Efforts are described in the Disposal of Non-Contaminated Material section on page 2-11 (Section 2.1.5).
- Improving parking for workers and visitors during and after construction of the Integrated Research Facility. This is part of the Reasonably Foreseeable Actions as described on page 4-1.
- Implementation of a car-pooling program for workers commuting to the RML campus. This measure will not be included in the Proposed Action. Parking and traffic are addressed under social issues in Chapter 4. Impacts from added traffic do not require mitigation. Additional analysis of the alternatives on traffic has been included in Section 4.2.1.
- Adopting a policy of studying only those agents associated with emerging diseases at the Integrated Research Facility, and not agents associated with bioterrorism or biodefense. This measure is not included in the Proposed Action because it is in direct conflict with the Purpose and Need (see Section 1.4).
- Creation of a citizen oversight committee to monitor activities at the Integrated Research Facility. This measure will not be included in the Proposed Action because monitoring is done by RML for a number of state and federal agencies and the results are made public. The Community Liaison Group, composed of community members, serves to monitor activities at RML. The RML Institutional Biosafety Committee and the RML Animal Care and Use Committee also have community representatives.
- Improving aesthetics of the campus. This measure is included in the Proposed Action, as well as in Reasonably Foreseeable Actions as described on page 4-1. Aesthetics were considered in the design of the building and landscaping, as well as in the effects analysis.
- Implementation of regular effluent monitoring of air emissions and wastewater discharges are included in Air Quality and Wastewater sections in Chapter 3. The City of Hamilton Department of Public Works conducts wastewater testing (which RML pays for), and RML conducts monitoring of incinerator operating parameters every 60 seconds when the incinerator is operating, as required by their MDEQ Air Quality Permit.
- Use of local contractors for design and construction of the Integrated Research Facility to the greatest extent possible. NIH has hired a national design and engineering firm that specializes in designing and building BSL-4 laboratories. Federal Acquisition Regulations (FAR) require one quarter of participating companies to be small businesses from the region. Local contractors would have the same opportunities as others to work on the project.
- A commitment for direct improvements to the hospital, streets, and emergency response agencies by NIH. This is included in the Reasonably Foreseeable Actions as described on page 4-1.
- Noise and light reduction through more landscaping and buffering. This measure is included in the Proposed Action, as well as Reasonably Foreseeable Actions as described on page 4-1, and was considered in the design of the building as well as in the effects analysis. Information on recently completed noise reduction efforts has been included in Section 3.4.
- Establishment of a process where neighbors could bring concerns to RML during and after construction of the Integrated Research Facility. This measure was included in the Proposed Action. Meetings with neighborhood representatives would be held regularly before, during, and after construction. In addition, the Community Liaison Group, including local residents, will address issues brought to it.
- Purchase of homes at fair market value for anyone that requested it within a few blocks of the Integrated Research Facility because of a

perceived fear of lost value once the Integrated Research Facility is completed. This measure is not included in the Proposed Action because there is no indication that the Proposed Action will have a negative effect on property values (see Chapter 4).

- Publish an emergency plan to be implemented should a laboratory worker be exposed to an agent or in the unlikely release of an agent to the neighborhood. This is already planned, regardless of which alternative is selected, and is included in the description of No Action. RML staff meets periodically with representatives from the FBI, U.S. Attorney's Office, and other local law enforcement to share information and strengthen communication among these groups. RML is a member of the Montana Anti-Terrorism Task Force, the Ravalli County Local Emergency Planning Committee, and Ravalli County Terrorism Preparedness Task Force and will participate in the Ravalli County Pre-Mitigation Plan authorized under the Disaster Mitigation Act of 2000. Emergency BSL-4 procedures are outlined in **Appendix E**, Part 4 of the Standard Operating Procedures (pp E-23 to E-27).

Additional mitigation measures were suggested in comments on the DEIS. They are:

- Include in the federal budget all necessary funds to replace or repair inadequate water mains, pipes/sewer lines, and roads in the city of Hamilton. This measure will not be included in the EIS because these are the responsibility of the city. RML pays for these services as well as their share of upgrades through utility bills.
- Commit to posting a bond in an amount that would cover the expenses of a worst-case scenario where an infectious agent is released to the community. NIH is prohibited by statute from agreeing to post such a bond, but any claims for personal injuries and property damage arising from the negligent acts or omissions of a federal employee may be filed with the United States in accordance with the Federal Tort Claims Act, 28 U.S.C 2671-2680.
- Direct filtered airflow discharges from BSL-4 lab to incineration or autoclave system and monitor temperatures and pH levels of biowaste cookers and digesters. This measure was not included because HEPA filtration of air and sterilization of waste leaving the containment zones undergo several stages of purification before discharge. At the time of release, by-products have already undergone destruction under extreme heat; therefore no additional assurances through incineration or autoclaving are needed. Additional information on the HEPA filters and their maintenance are included under Air Treatment in Section 2.1.3.

There were no additional mitigation measures identified in the comments on the SDEIS.

1.7.3 Effects Analysis Comments

The bulk of the public comments are addressed in the DEIS through a detailed description of the Proposed Action and evaluation of direct, indirect, and cumulative impacts and operations. Issues addressed in the EIS include:

- Short- and long-term impacts associated with parking, noise, lighting, visual aesthetics, and increased traffic in the neighborhood surrounding the RML. This information is included in Chapters 2 and 4 of the EIS. For the SDEIS, additional information on the construction noise and the cumulative effects analysis was clarified. New information was obtained on the current site conditions, which is also included in Chapter 3.
- Impacts on the underlying aquifer from increased water usage. This topic was included in the DEIS in Section 4.8. Additional information was included in Water Supply (Section 4.8) of the SDEIS. This information has been clarified for the FEIS.
- Impacts on the City of Hamilton water and wastewater systems. This topic was included in the DEIS in Section 4.8. Additional information has been included in the Water Supply (Section 4.8).
- Impacts on community infrastructure such as schools, roads, and emergency response agencies. Information was included in Section 4.2 of the DEIS. Additional information on the effects on emergency providers has been included in subsequent EIS documents.
- Increased use and disposal of hazardous chemicals by the Integrated Research Facility.

Information on the use and disposal of hazardous waste was included in the DEIS in Section 2.1.3. Additional information on past use and existing permitted levels has been included in Section 2.1.5 and 2.2.1.2.

- Potential increased threat of outbreak of agents through transport, internal sabotage, inadvertent releases, and outside terrorism. Community safety was addressed in the DEIS. Additional information on the past safety record of biocontainment facilities worldwide is included in the EIS in **Appendix D** – Review of Biocontainment Laboratory Safety Record.
- Cultural and historical impacts. This assessment was included in the DEIS in Section 4.6. Since the DEIS was completed, the Montana State Historic Preservation Office has determined that the project would have no adverse effect on the RML historic district. This information has been included in the SDEIS and FEIS.
- Full description of agents to be studied at the lab. This information was included in **Appendix B**.
- Discussion of the security of the facility, including worker clearances. This information is discussed in Section 2.1 and **Appendix C**. In addition, **Appendix E** – Standard Operating Procedures for a BSL-4, is included in the SDEIS (and FEIS) with additional information on security measures.
- Impacts on air quality associated with increased use of the incinerator. Information was included in Section 4.7.1 of the DEIS. Additional information on air quality has been included in Sections 3.7 and 4.7.
- Social and economic impacts of the Integrated Research Facility such as population growth, potential decrease in property values, employment, and school enrollment. This information was included in Section 4.2 of the DEIS. Additional information on the effects of BSL-4 laboratories on housing prices has been included in Section 4.2.
- Potential damage to the Integrated Research Facility from an earthquake or flood. Construction methods to prevent damage from earthquakes were included in Section 2.1 of the EIS. Flood damage would be avoided by not constructing the facility in the 100-year floodplain, which is addressed in Chapter 3 (Section 3.9.3).
- Description of previous releases of biological agents at RML. This information is included in the new **Appendix D**.
- Discussion of any new or expanded permits that would be required for the Integrated Research Facility. This information was included in Chapter 3 of the DEIS and subsequent EIS documents.

Additional comments made on the DEIS on effects analysis include:

- Impacts on wetlands, wildlife, and threatened and endangered species. These resources were addressed in the DEIS as Resources Not Affected (Section 3.9). Rationale for why these resources would not be affected is included in that section.

There were no new analysis issues identified in comments on the SDEIS.

1.7.4 Issue or Concern Outside the Scope of the EIS

The following comments made during the initial scoping period were determined to be outside the scope of the analysis because the information was not relevant to the decision, not affected by the proposed action, not within the analysis area, or already decided by law or policy:

- Statements of support or in opposition to the project. These comments are outside of the scope of the analysis in the EIS, but they will be considered during decision-making and addressed in the Record of Decision.
- Delays caused by the NEPA process.
- Decision-making authority.
- Research of cancer incidents in the neighborhood and results of toxic dumping.
- A programmatic EIS should be done for the proposed upgrade at RML as well as those upgrades or new facilities proposed across the country. Locations and plans for current and future BSL-4 laboratories nationwide should be disclosed.

- How long would it take for smallpox to spread through a town such as Hamilton?
- Redirect the money for this project to AIDS research or universal health care.
- NEPA coverage for previous projects at RML was inadequate.
- Provide detailed project budget in the EIS.
- Please list all violations in RML's history. What were they? When did they occur? How and when were they cleaned up or resolved?
- Provide a detailed budget for the project disclosed in the EIS.
- Will public have opportunity to oversee the building/engineering process? Commentors would like for public to be involved in the certification process, specifically the testing to meet BSL-4 standards and codes, and for these documents to be made public.

An additional comment was made on the DEIS that was considered outside the scope of the EIS:

- Effects downwind on our Canadian neighbors.

There were no additional comments on the SDEIS that were considered outside the scope.

1.7.5 Other Comments on the EIS

A few comments on the EIS were received that did not fit into the categories for scoping comments, but information has been included to address them. They are:

- No one who prepared the DEIS appear to have the experience in safety or microbiology to assure the public that the DEIS has the scientific integrity required by NEPA. In response to this comment, the List of Preparers has been expanded to include NIH personnel who were integral in the preparation of the DEIS and SDEIS and their qualifications.
- Construction began for proposed alternative, which has irrevocably committed resources. To clarify, no construction on the Integrated Research Facility has occurred. Some money has been spent by NIH to design the facility, which is needed to complete the NEPA analysis.

CHAPTER 2
PROPOSED ACTION AND ALTERNATIVES

This chapter describes NIH's proposal to construct an Integrated Research Facility and upgrade existing facilities at the RML campus in Hamilton, Montana. The proposed new structure and infrastructure upgrades are collectively referred to as the Proposed Action. Alternatives to the Proposed Action are also included in this chapter.

Detailed discussions of the following topics are presented in this chapter:

- The Proposed Action; and
- Alternatives to the Proposed Action, including the No Action Alternative and Alternatives Considered but Eliminated from Detailed Study.

2.1 PROPOSED ACTION

NIH proposes to construct an Integrated Research Facility to house Biosafety Level (BSL)-2, BSL-3, and BSL-4 laboratories, animal research facilities, administrative support offices, conference rooms, and break areas at the RML facility in Hamilton, Montana. The Proposed Action would encompass approximately 105,000 square feet of building constructed within the existing 33-acre RML campus in the southwest portion of Hamilton (**Figure 2-1**).

The Integrated Research Facility and research programs would require additions and upgrades to the existing RML campus. Upgrades would include:

- A new chilled water plant and emergency power backup system;
- A new addition to Boiler Building 26 to house a new natural gas-fired boiler; and
- Construction of below-grade systems and utility distribution tunnels to service the Integrated Research Facility.

Research at RML would include pathogenesis, immune response, vaccine, diagnostics, and therapeutics work and would focus on RML's strength in vector-borne pathogen research.

2.1.1 Biosafety Level 4 (BSL-4)

A BSL-4 laboratory would be constructed within the Integrated Research Facility to provide the highest possible level of protection for scientists and the public and to expand the research capability of RML. The use on a BSL-4 laboratory would be required for research of certain agents and for certain experiments, such as testing of vaccines for emerging and re-emerging infectious microbial agents that are normally ranked at BSL-3 level. Stringent safeguards, including engineering and design features (see **Appendix E**), are required for BSL-3 and BSL-4 laboratory facilities to prevent pathogens from escaping into the environment. In addition, the BSL-4 laboratory would be designed to prevent contact between pathogens and people inside the workspace and provide secure storage for infectious agents.

A BSL-4 laboratory is required for work with agents that pose a high individual risk of aerosol-transmitted infections and life-threatening disease. Agents with a close or identical antigenic relationship to BSL-4 agents would be handled at this level until sufficient data are obtained to confirm continued work at this level, or at a lower level. All laboratory staff would have thorough training in handling hazardous, infectious agents; understanding primary and secondary containment functions of standard and special practices; and understanding containment equipment and laboratory characteristics. All laboratory staff would be supervised by trained and experienced scientists (see **Appendix E**).

Prior to gaining access to the BSL-4 laboratory for the first time, a scientist would submit a copy of an experimental protocol to be reviewed by the Laboratory and Branch Chief. Upon approval, the protocol would then be reviewed by the Institutional Biosafety Committee. Next, the Scientific Director and the Program Review Committee must approve the plan. After all these approvals have been received, individuals seeking access to the BSL-4 laboratory would undergo a security authorization.

A specific facility operations manual would be prepared and adopted. The BSL-4 laboratory would have special engineering and design features to prevent microorganisms from escaping into the environment (**Figure 2-2**).

The primary containment barrier in the laboratory is the biological safety cabinet, designed to provide a clean workspace and filter exhaust air. The second containment barrier is the BSL-4 laboratory itself. The BSL-4 laboratory would be located within the central core of the building, surrounded by a buffer corridor between the laboratory and the exterior. The buffer creates a stable pressure zone to eliminate impacts such as wind and temperature on the exterior of the building, which can affect pressure differentials. The BSL-4 laboratory would be designed and tested to ensure it is airtight.

2.1.2 Integrated Research Facility

The Integrated Research Facility would be a three-storied building, linked to the existing BSL-3 laboratory by two on-grade corridors. The Proposed Action consists of BSL-2, -3, and -4 laboratories and a boiler plant addition. The area of each component is shown below. The total area is approximately 105,000 functional gross square feet (**Table 2-1**).

Table 2-1.
Proposed Action Areas

Area	Size (feet^2)
BSL-4	6,750
BSL-3	2,950
BSL-2	14,650
Common Areas/Office	25,650
Boiler Addition	1,810
Connection to Bldg. 25	2,034
Chiller	2,679
Mechanical	48,609
Total	**105,132**

2.1.3 General Building Design Components

Water System

The proposed Integrated Research Facility would be connected to the existing water main south of the proposed building. Hook-up would include a backflow prevention device. Water would be supplied by the City of Hamilton.

Sanitary Sewer

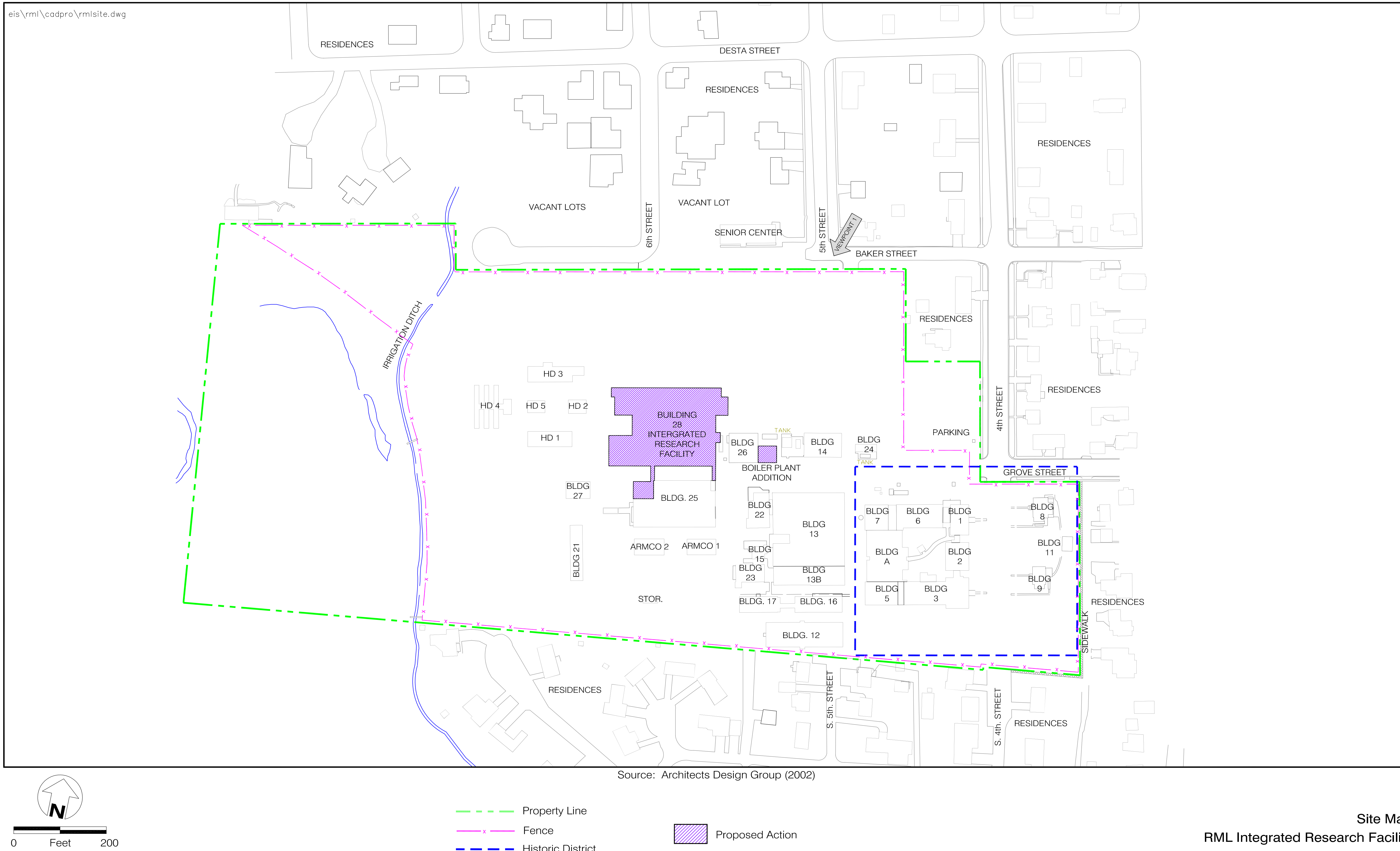
The Integrated Research Facility would connect to the existing City of Hamilton sewer system. All liquid waste from the high containment area would receive additional special treatment and monitoring before entering the sewer system (see Waste Decontamination on page 2-6).

Air Treatment

All air supplied to and exhausted from the BSL-4 laboratory would be High Efficiency Particulate Air (HEPA) filtered. Laboratory air passes through a minimum of two HEPA filters, in series, prior to release to the outdoors. All ventilating systems would be redundant, monitored, and maintained to assure appropriate containment (CDC/NIH 1999).

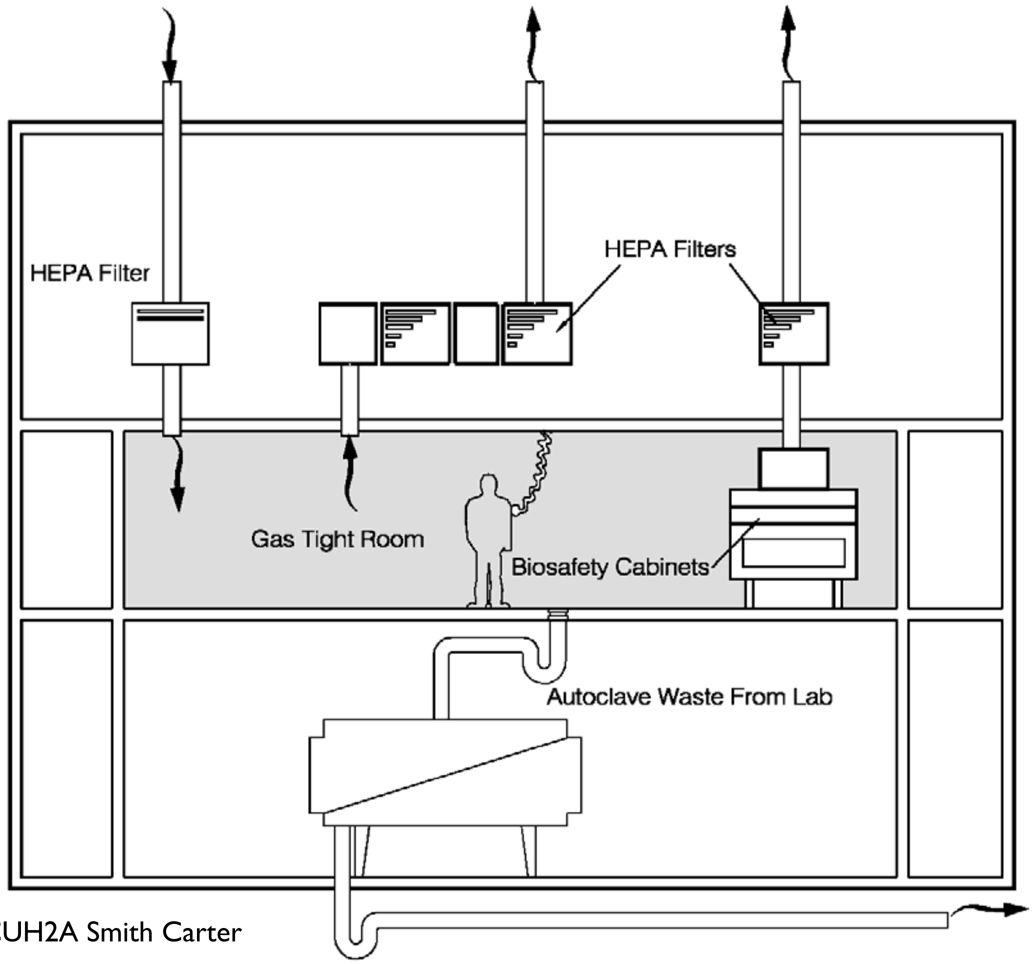
HEPA filters use a combination of methods to remove particles. As air moves across the filter, particles are caught by interception, inertial forces, and diffusion. The 0.3-micron particle size represents the most difficult size to capture for the HEPA filters; particles that are larger and smaller than 0.3 microns are actually captured more efficiently. Most bacterial and fungal particles are larger than 0.3 microns; most viruses are smaller. Therefore, these particles are filtered at a higher efficiency than 99.97 percent. Research has shown that undamaged filters remove 99.97 percent of 0.3 micron particles after more than a decade of continuous use (Edwards 2002).

Exhaust air from the BSL-4 laboratory suit area, decontamination shower, and decontamination airlock would be treated by passage through two HEPA filters in series rated for microbial aerosols before discharge to the outside. The air would be discharged away from occupied spaces and air intakes. HEPA filters would be located as near as practicable to the source in order to minimize the length of potentially contaminated ductwork. Laboratory biological safety cabinets (including air filters) would be certified once a year to ensure proper function. Safety cabinets would be re-certified when moved or relocated to a new area, as this could alter airflow and the functioning of the cabinet. Re-certification includes testing the HEPA filter, gaskets, and other air-handling systems in the cabinet.



Source: Architects Design Group (2002)

Site Map
RML Integrated Research Facility
Hamilton, Montana
FIGURE 2-1



Source: CUH2A Smith Carter

Figure 2-2. Containment Design

HEPA filters would be disposed of through decontamination and incineration. HEPA filter housings would be designed to allow for decontamination of the filter before removal for incineration. Alternatively, the filter can be removed in a sealed, gas-tight primary container for decontamination and/or incineration.

Storm Water

Storm water runoff from the RML campus would flow into drywells, which would discharge to groundwater below the site. One drywell would be constructed for each 300 square feet of drainage area. The drywells would be six feet in diameter and eight feet deep. Roof drains would be connected to a drywell.

Fire Protection

Fire protection systems would be installed in the Integrated Research Facility to meet or exceed requirements of all applicable codes, standards, and guidelines. The fire protection system would be simple to understand and maintain, and able to respond to changes in function or load with only minor modifications. It would perform under varying operating conditions.

Emergency Electrical Power Systems

A 2,000 KW/1563 KVA emergency generator with a 2000-ampere emergency/standby switchboard would be installed on the lowest floor of the Integrated Research Facility. Sufficient fuel storage would be provided to run the emergency generator for 72 hours. Additionally, a second 600 KW standby generator would be installed to support the new chiller plant.

Seismic Requirements

The Integrated Research Facility would be designed in accordance with Essential Facility requirements of the International Building Code developed by the International Code Council with the intention that the facility would remain fully operational after a seismic event of a magnitude prescribed by the code. The facility would be classified as a Seismic Use Group III building in accordance with the International Building Code. The facility would be designed under Seismic Design Category C, which requires structure functionality to survive the event.

Showers

The BSL-4 laboratory would be designed to ensure passage through changing and decontamination areas prior to entering rooms where work would be preformed with BSL-4 agents (suit area). Personnel entering a decontamination area would wear a one-piece positive pressure suit ventilated by a life-support system protected by HEPA filtration. The life support system includes redundant breathing air compressors, alarms, and emergency backup air tanks. Entry to this area would be through an airlock fitted with airtight doors. A chemical shower would be provided to decontaminate the surface of the suit and other personal protective equipment before the worker leaves the area. BSL-4 laboratory workers leaving the laboratory would also take a shower. An automatic emergency power source would be provided at a minimum for the exhaust system, life support systems, alarms, lighting, and entry and exit controls. Air pressure within the suit would be higher than that of any adjacent area. All penetrations into the suit area, chemical showers, and airlocks would be sealed and tested to be gas tight.

Waste Decontamination

Contaminated solid waste which has been exposed to a biohazardous agent or generated in a laboratory, such as animal bedding, would be treated before disposal. All waste from the BSL-4 laboratory would be considered contaminated. Treatment would consist of autoclaving and disposing as general waste; incinerating and disposing as general waste; incinerating and disposing of ash or alkaline hydrolysis; and disposing through sewage systems.

Laboratory liquid waste from the BSL-4 laboratory would be piped to three biowaste cookers (one cooker would be operating, one filling, and one for redundancy). The liquid waste would be heated under pressure to a temperature above 121°C for a minimum of 60 minutes to ensure sterilization. Biosensors, electronic monitoring, and charting would be used to verify proper operation of waste decontamination systems.

An alkaline hydrolysis process tissue digester would be installed for solid (animal) infectious waste disposal. This system would use alkaline hydrolysis at an elevated temperature to convert proteins, nucleic acids, and lipids of all cells and tissues, as well as infectious microorganisms (including prions), to a sterile aqueous solution of small peptides, amino acids, sugar, and soap suitable for disposal to a sanitary sewer. The tissue digester would consist of an insulated, steam-jacketed, stainless steel vessel. Liquid waste from the tissue digester would be discharged to a stainless steel holding tank. The holding tank would slowly discharge the waste into the sanitary sewer storage tank over a 48-hour period to dilute the waste to acceptable limits for the Hamilton City Sewer Treatment plant (CHDPW 2002).

Effluent from biowaste cookers would be discharged to a 12,000-liter (3,170-gallon) atmospheric tank for blending with other liquid waste from the building. The blending tank acts as a cool-down for biowaste material discharged from the cookers and dilutes the waste from the building to ensure compatibility with the city sewer treatment facility. Duplex grinder submersible pumps would evacuate the tank. A cold-water injection system would be installed for backup in the event that discharge from the blending tank exceeds the maximum 60°C temperature requirement. A test port would be provided downstream to allow users and city representatives to insert a test probe to analyze sewer discharge on a regular basis.

All vent piping from the biowaste system would pass through a double HEPA filter (or other microbial filters) before venting to the atmosphere. HEPA filters would be changed every five years and disposed of after decontamination with chemical disinfectant and incineration.

Biological materials removed from the BSL-4 laboratory in a viable or intact state would be contained in a sealed, primary container. The primary container would be placed inside a non-breakable, sealed secondary container and removed from the facility through a disinfectant dunk tank, fumigation chamber, autoclave, or an airlock designed for this purpose. No materials, except biological materials that are to remain in a viable or intact state, would be removed from the BSL-4 laboratory unless they have been autoclaved or otherwise decontaminated before leaving the laboratory. Equipment or material that could be damaged by high temperatures or steam may be decontaminated by gaseous or vapor methods in an airlock or chamber designed for this purpose.

The digester system would be physically and biologically tested to verify that design and operation parameters have been met before operation, and annually thereafter. Testing of the system would include introduction of a carcass which has been injected (in multiple locations) with a suspension of benign indicator spores. A minimum six-log reduction (1/1,000,000) of the culture population would constitute acceptable performance of the liquid decontamination system. The control system for the tissue digester generates a batch report to confirm a successful digester run, including the date, time, temperature, pressure, load weight, level, and process time for each cycle. Using this information, the operator can modify the temperature, pressure, and length of cooking time to achieve acceptable decontamination before the system is operational.

Each batch of digestate (remaining solids) is transferred to the digestate holding tank, which is equipped with a discharge pipe that releases the batch into the blending tank. The amount blended into the tank is controlled by allowable limits for discharge to the sanitary sewer. The high biological oxygen demand wastewater generated by the alkaline hydrolysis process requires that no more than three times the volume of the discharge pipe (800 liters) be added to the 12,000-liter blending tank.

Safety

The RML Biosafety Committee, NIH Associate Director for RML, and relevant RML safety and biosafety staff would oversee efforts related to planning and design of the facility including review and approval of proposed protocols and standard operating procedures for the laboratory prior to use. RML would use the standards and procedures (USDHHS 1999) recommended for all institutions engaged in biological research. A description of standard and special safety practices for working with biological materials is contained in **Appendix E**.

One-piece positive pressure personnel suits ventilated by a life support system would be used for all activities in the suit laboratory (BSL-4). Standard safety practices for access, personnel protection, and disposal of contaminated material are described elsewhere in this chapter. A complete description of standard and special safety practices for a BSL-4 laboratory is contained in **Appendix E**.

Energy Consumption

RML currently spends approximately $1.4 million annually for electricity and natural gas used at the facility. The electrical power source is Kerr Dam near Polson, Montana. Natural gas is provided by NorthWestern Energy from sources within and out-of-state. Power consumption at the Integrated Research Facility is estimated to increase to an annual cost of $2.1 million. The additional electrical power and natural gas would be supplied by current sources.

Several energy-saving devices would be incorporated into the proposed facility including, but not limited to, power-saving equipment and lighting and enhanced insulation.

Noise Reduction

The Integrated Research Facility would be designed to not exceed RML's draft noise guideline of 55 dBA at the property boundary during the day and 50 dBA at night (7:00 pm to 7:00 am). Design elements to reduce noise include:

- Selecting fans for exhaust and air handling units that can work adequately at their lowest possible speed to reduce fan noise;
- Installing a silencer or bank of silencers in the air-handling unit, in the exhaust ductwork or stacks, and in the emergency generator;
- Smooth transitions and elbows to limit turbulent airflow;
- Selecting quiet equipment;

- Conducting tests of the emergency generator during normal weekday working hours and not during quiet periods;
- Installing a muffler as part of the generator exhaust system;
- Covering as much of the ceiling and wall surfaces inside the generator room as feasible with absorptive material;
- Limiting the discharge air opening for the emergency generator to as small as feasible;
- Construction of an eight-foot high acoustical concrete masonry screen wall west of the relocated chiller; and
- Using manufacturer-supplied inlet and discharge attenuators on the cooling towers.

To reduce noise from construction, the following measures would be used to mitigate for temporary construction noise:

- Construct temporary barrier walls prior to construction;
- Install high-grade mufflers on the diesel-powered construction equipment and generators;
- Combine noisy operations to occur for short durations during the same time periods; and
- Construction activities would only occur from 7:00 am to 5:00 pm.

Noise monitoring and mitigation would occur as described in the No Action Alternative.

2.1.4 Operations

2.1.4.1 Commissioning Plan[1]

Commissioning the BSL-4 laboratory would consist of systematically subjecting the facility to various operating and failure modes to ensure the laboratory systems function properly. The process would document that specified structural components, systems and/or system components have been installed, inspected, functionally tested, and verified to meet specific requirements. The respective system's design criteria and design function establish these requirements.

Commissioning

Commissioning is a systematic process of ensuring that all building systems perform interactively according to the design intent and operational needs. The commissioning process shall encompass and coordinate the traditionally separate functions of system documentation, equipment start-up, control system calibration, testing and balancing, performance testing, and training.

Commissioning during the construction phase is intended to achieve the following:

- Verify applicable equipment and systems are installed according to the manufacturer's recommendations and industry standards, and they receive adequate operational checkout;
- Verify and document proper performance as well as failure modes of critical equipment and systems;
- Verify that operation and maintenance documentation is complete; and
- Verify that RML's operating personnel are adequately trained.

System Testing

System tests are to ensure that equipment and systems have been properly installed and meet applicable operational design specification. In general, each system would be operated through all modes of operation (seasonal, occupied, unoccupied, warm-up, cool-down, part- and full-load and redundant, fail safe) where there is a specified system response. Verifying each sequence of operation is required. Proper responses to modes and conditions such as power failure, fire alarm conditions, biohazard, and specific system failures. System tests include:

- Pressure test of special rooms;
- Breathing air system (including suits);
- Liquid decontamination system;
- Chemical shower system;
- Chilled water system;

[1] Information from the 95% complete CUH2A Smith Carter Pre-Final Review Project Manual dated August 7, 2003.

- Emergency generator system; and
- Security system (proximity card, operational software, door zones' access, interlock groups, closed-circuit TV cameras, and recording).

Integrated System Testing

Integrated system tests are used to demonstrate that each system is operating in concert with other systems according to the specified design. Proper responses to modes and conditions such as power failure, fire alarm conditions, biohazard, and specific system failures would also be tested. Goals of the integrated system tests are:

- Verifying that the facility has met construction design criteria;
- Providing the operation and maintenance staff with meaningful, hands-on demonstration of the facility's operation;
- Documenting the failure condition and response of the facility; and
- Identifying any trends in baseline data.

Functional Operation System Test

The functional operation system test provides a 30-day period for the facility to adjust to normal operational patterns. The test monitors the facility and lab functions, the life safety elements of the system operations (specifically as they relate to the interlocks of the various systems), fire alarms, and security and air systems. Training RML and local emergency personnel for high containment systems would be held during this period.

The functional operation system test would begin after the BSL-3 and BSL-4 laboratories and systems are complete with no deficiencies. Some minor adjustments may be made to optimize some system operations.

The testing would ensure fail-safe operation of the building to demonstrate that the building, occupants, and general public remain safe and biological hazards remain contained. Additional testing would be conducted to verify or recommission areas of specific concern or failure during the test. This would be the final acceptance test for the facility. Goals of the functional operating system test are:

- Demonstrate that each system is operating in concert with other systems;
- Verify the facility has met construction design;
- Provide operations and maintenance staff and local emergency personnel with in-depth training on various systems;
- Bring the entire facility from a state of substantial completion to full dynamic operation;
- Document failure conditions and response of the facility;
- Adjust systems for optimal performance as systems settle into a routine operating pattern; and
- Document variables to obtain facility operational and utility baseline data.

Animal Care and Use

Some of the biodefense and human disease research conducted in the proposed Integrated Research Facility would use animal models. The NIAID DIR would oversee all research activities involving the use of laboratory animals. These research activities would conform to the:

- Counter-Bioterrorism Research Agenda of NIAID for CDC Category A Agents;
- NIAID Biodefense Research Agenda for Category B and C Priority Pathogens; and
- NIAID Strategic Plan for Biodefense Research.

The Comparative Medicine Branch would administer the NIAID, DIR Animal Care and Use Program of the Integrated Research Facility. The number of laboratory animals required would depend on research requirements.

The Integrated Research Facility would use existing NIH and RML committee structures to oversee the animal facilities and programs at the Integrated Research Facility including research involving animals, research protocol reviews, documentation of training reviews, and semi-annual facility inspections. All research involving animals at RML will be conducted in full compliance with applicable regulations, including the Animal Welfare Act 7USC 2131 *et seq.*, The United States Department of Agriculture regulations implementing the Animal Welfare Act, 9 CFR Part 1, 2, and 3, the Public

Health Service Policy on Humane Care and Use of Laboratory Animals, and NIH Policy Manual Chapter 3040-2, Animal Care and Use in the Intramural Program (2002). Research protocols involving animals will be reviewed by the RML Animal Care and Use Committee.

RML has been inspected and fully accredited by the Association for Assessment and Accreditation of Laboratory Animal Care International (AAALAC International) since the 1970s. These inspections are done every three years by experts in animal care and use. Animal facilities are designed to provide suitable, secure, and consistent environmental conditions for research animals.

The Chief, RMVB, would provide support, research, and consultation in laboratory animal medicine; attending veterinary care; comprehensive animal husbandry; training in laboratory animal medicine, science, and animal care and use procedures; and review of research protocols for proper and lawful animal use. The Chief, RMVB, would conduct safety reviews, risk assessments, and semi-annual inspections of animal facilities. NIAID DIR would develop standard operating procedures that specify administrative guidelines; feed, bedding, and water; animal procurement and care; facility and equipment operations; waste disposal, sanitation, and sterilization procedures in accordance with NIH policies.

The Chief, RMVB, would report to the Director of the Division of Intramural Research (DDIR), NIAID. The DDIR would be responsible for implementing and administering animal use policies and would serve as a liaison between the Chief, RMVB, scientists, and NIH officials (e.g., Deputy Director for Intramural Research, Director of the Office of Animal Care and Use). The DDIR is also responsible for ensuring participation in the Animal Exposure Surveillance Program (AESP) by researchers that would work with animals. The AESP is a mandatory surveillance program managed by the Occupational Medical Service of NIH, and individuals that elect out of the program would be denied permission to participate in animal studies (NIH Policy Manual 3040-2, 28 March 2002).

Research involving rodents and lagomorphs would be performed in the biocontainment suites of the Integrated Research Facility. The procedure for removal of rodents and lagomorphs (e.g., rabbits) from the biocontainment suites would involve euthanizing animals and then autoclaving the carcasses. Animals would be held in species-specific animal housing within biocontainment animal rooms. All studies involving etiologic agents would be conducted at levels appropriate to the study (BSL-2, -3, or -4).

Non-human primates (NHPs) would also be used as animal models in the Integrated Research Facility. NHPs would be housed in the Integrated Research Facility in accordance with federal, state, and local guidelines and regulations. Personal protective equipment used in NHP housing areas would follow guidelines outlined in the NIH Policy Manual 3044-2, Protection of NIH Personnel Who Work with Non-human Primates (9 February 1993), and the Biosafety in Microbiological and Biomedical Laboratories (4th edition 1999).

NHPs within Animal Biosafety Level - 2 (ABSL-2) suites containing only non-transmissible, non-latent infectious agents may be removed from the suite provided they are healthy and demonstrably immune to all agents in use. NHPs previously infected with transmissible or possibly latent agents would only be removed to other biocontainment suites with an equal or higher level of biocontainment. Removal to other biocontainment suites would be coordinated with the Chief, RMVB, and only done if the principal investigator and DDIR are informed and concur with the movement. NHPs would be transported between suites in sealed, leak-proof containers that have been disinfected. The containers would be sterilized after use. NHPs in suites where transmissible possible latent agents are used would be treated as potentially infected with these agents (Elkins 2003).

Neighborhood Meetings

Meetings with community representatives would be held regularly before, during, and after construction to maintain dialogue about RML's operations. Additional means of communication (mailing lists, e-mail lists) would be established with neighbors and people in the Community Liaison Group.

BSL-4 Laboratory Access

Only people completing the security clearance and approval process would be allowed to enter the

BSL-4 area. Safety precautions at the access point for the BSL-4 laboratory would include:

- Only persons whose presence in the respective laboratory is required for program or support purposes would be authorized to enter;
- Access would be limited by secure, self-closing, lockable doors managed by the facility manager or biosafety control officer;
- Biometric devices and touch pads would be used to screen anyone entering the laboratory;
- Upon entry, everyone would be advised of the potential biohazards and given instructions on safeguards;
- Date and time of entry and exit would be logged for everyone accessing the BSL-4;
- Complete laboratory clothing (undergarments, pants, shirt, shoes, gloves, etc.) would be used by all personnel entering the laboratory;
- A complete clothing change and decontamination shower would be required of personnel leaving the laboratory; and
- Supplies and materials used in the laboratory would be brought through a double-door autoclave, fumigation chamber, or airlock, which would be decontaminated between uses.

Personnel Protection

Personnel protection measures used by laboratory workers would include:

- Laboratory personnel would receive available immunizations for agents handled or potentially present in the laboratory;
- The current serologic surveillance program would be continued whereby baseline serum samples for all laboratory and other at-risk personnel would be collected and stored;
- Laboratory and support personnel would receive appropriate training concerning potential hazards associated with the work;
- Laboratory equipment would be decontaminated daily and after each procedure;
- Equipment would be decontaminated before repair or maintenance is performed; and
- Daily inspections of all containment parameters (e.g., directional airflow) and life support systems would be completed before laboratory work is initiated.

Disposal of Contaminated Material

Except where noted above, disposal of contaminated materials generated by the Integrated Research Facility would be the same as described under the No Action Alternative.

Disposal of Non-Contaminated Material

Except where noted above, disposal of non-contaminated materials generated by the proposed Integrated Research Facility would be the same as described under the No Action Alternative.

Security

Planning and implementation of the NIH police force would continue as described under the No Action Alternative. Under the proposed action, police would be located throughout the RML campus and within the Integrated Research Facility. Additional police officers may be hired depending on current security policies and procedures. All construction contractors would be subject to background checks prior to commencing work.

Security described under the No Action Alternative would apply to the Proposed Action.

Emergency Plan

The current Emergency Plan would be updated and address issues associated with the building prior to its operation. See Section 2.2.1 under the No Action Alternative for a description of the current plan.

2.1.5 Pollution Prevention

Spill Prevention

Spill prevention associated with the Integrated Research Facility would be the same as described under the No Action Alternative. In addition, fuel storage and dispensing during construction would occur in a designated staging area at the construction site. The construction contractor would limit equipment and materials storage to the staging area and be responsible for securing access and hazardous material containment and cleanup.

The contractor would also be responsible for all other materials and chemicals used in the maintenance of equipment and machinery during construction. All spills, except as noted below, will be reported immediately to the state's Disaster and Emergency Services Division (DES) 24-hour phone number (406) 841-3911. If no one can be reached at that number, the spill may be reported to the Montana Department of Environmental Quality (MDEQ) duty officer at (406) 431-0014.

The following types of spills are not required to be reported, provided, the spilled material does not enter or threaten to enter state water, and that it is immediately contained, removed, and properly treated or disposed of in accordance with state regulations:

- 10 barrels (420 gallons) or less of crude oil, produced water, injection water, or combination thereof; or
- 25 gallons or less of refined crude oil products, including but not limited to gasoline, diesel fuel, aviation fuel, asphalt, road oil, kerosene, fuel oil, and derivatives of mineral, animal, or vegetable oils.

Through use of a designated staging area for construction equipment and materials, accidental spills would be limited to a specific area. Storm water and runon/runoff management controls would be implemented and include mitigations such as a silt fence on the west side of the site. Site personnel would be able to respond rapidly and appropriately to spills and minimize their extent and magnitude.

Hazardous Materials

Hazardous waste generated at the Integrated Research Facility would be managed as described in the No Action Alternative. Hazardous waste generated during and after construction of the Integrated Research Facility would be less than 220 pounds of hazardous waste generated within any calendar month. No more than 2,200 pounds of hazardous waste would be accumulated at any one time, and no more than 2.2 pounds of acute hazardous waste or 220 pounds of soil contaminated from an acute hazardous waste spill would be generated or accumulated at any one time, on the entire RML campus. Use of hazardous materials and generation of hazardous waste may be expected to increase slightly with the addition of the Integrated Research Facility, but not commensurate with the 30 percent increase in the number of employees at RML.

Radioactive Materials

Radioactive materials used at the Integrated Research Facility would continue to be managed and disposed of as described in the No Action Alternative.

Generation of low-level radioactive waste is anticipated to increase about 30 percent with construction of the Integrated Research Facility. However, alternative technologies that do not require use of radioisotopes have become available for labeling of proteins such as chemical luminescence and immunofluorescence. These technologies may be expected to reduce any potential increase in radioisotope usage at RML. Use of sulfur-35 is likely to increase because, according to RML personnel, it is the best way to label proteins within cells. RML has sufficient capacity in its decay-in-storage program to manage projected increases.

2.2 PROJECT ALTERNATIVE

The only alternative to the Proposed Action discussed in detail is the No Action Alternative.

2.2.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented. Existing operations at RML, including pollution prevention discussed under the Proposed Action, would be maintained and operated at current levels, and construction of a new Integrated Research Facility would not occur. The NIAID mission and its resources have been expanded to include development of diagnostics, therapeutic, and vaccines, which RML's current facilities cannot fully accommodate. It is likely that in the long term, current staffing levels and the operating budget at RML would be redirected to support this new mission.

Because of the need for the BSL-4 laboratory to be constructed at an intramural facility and within the limits of the budget, the No Action Alternative addresses all alternatives suggesting construction of the facility at another location. Selection of the No

Action Alternative would not preclude construction of the facility at another location. Consideration of constructing the BSL-4 laboratory at another location would require congressional action (authorization of additional funding) and another NEPA analysis on a site specific proposal, including scoping and other public comment opportunities. See Section 2.2.2 - Alternatives Considered But Eliminated from Detailed Study.

2.2.1.1 Operations

Noise Reduction

Periodic noise measurements will be taken by an independent professional acoustic contractor to evaluate compliance with voluntary guidelines. In the event that noise levels exceed the guidelines, NIAID would review possible alternatives to resolve the issues.

Disposal of Contaminated Material

Clothing used in the laboratory is autoclaved before laundering. Containers of used needles, sharp instruments, and broken glass are decontaminated before disposal in accordance with federal, state, and local regulations.

All prion contaminated animals and animal bedding/waste are disposed of via the approved method of on-site incineration. Ash from the incinerator is transported to a landfill. RML has been conducting TSE research for over 40 years employing these disposal methods.

Disposal of Non-Contaminated Material

Waste that has not come in contact with a biohazardous, radioactive, or chemical material is considered noncontaminated and is disposed of as general waste.

Security

Traditional laboratory biosafety guidelines emphasize good work practices, appropriate containment equipment, well-designed facilities, and administrative controls to minimize risks of accidental infection or injury for workers and to prevent contamination of the environment outside the laboratory.

Security at RML is governed by GSA Security guidelines and by statutes and regulations governing possession, use, and transfer of certain biological toxins and agents (select agents). Governing rules and guidelines include Section 817 of the USA PATRIOT Act; Section 351A of the Public Health Service Act (as amended by Section 201 of the Public Health Security and Bioterrorism Preparedness and Response Act and amended by Section 302(9) of the Homeland Security Act); and USDHHS regulations at 42 CFR Parts 72 and 73. Management periodically reviews safety policies and procedures for consistency with these regulations, other facilitywide policies, and adequacy to meet current conditions. Supervisors ensure that all workers and visitors understand security requirements and are trained and equipped to follow procedures. Safety policies and procedures are reviewed on an ongoing basis and whenever an incident occurs or a new threat is identified. Guidelines implemented for security include preventing unauthorized entry to laboratory areas and removal of dangerous biological agents from the laboratory.

An NIH police force has been established at RML. A full-time captain has been hired and is currently on site, and a sergeant was hired in January 2004. RML will eventually have six full-time federal police officers. The NIH police force will assist the current security guards in screening workers and visitors, conducting background checks, preparing and monitoring identification cards, security planning, and security implementation.

Access Control

Access into RML is controlled through the following measures:

- Background and security checks are conducted on new employees by the Office of Personnel Management for any security or laboratory assignment;
- Workers and visitors would display visible identification badges with a photograph and expiration date;
- A proximity reader system is used for clearance into restricted areas;
- Laboratories and animal care areas are separated from public areas;
- Laboratory and animal care areas are locked at all times;

- Entry and exit from laboratory and animal care areas is recorded;
- Only authorized personnel are allowed in laboratories and animal care areas;
- Freezers, refrigerators, cabinets, and other containers are locked where biological agents, hazardous chemicals, or radioactive materials are stored in unattended storage areas;
- Security cameras are located throughout the facility, on the perimeter, and in select buildings, including areas where biological agents are stored; and
- Visitors are cleared at the main entrance and escorted into the RML campus accompanied by an RML employee at all times. RML facilities are designed for high security maintained around-the-clock. Security guards and NIH police officers will be on campus at all times. Security of the interior is based on layers, where separate security zones in combination with access control devices, biometrics, and touch pads are required for access.

As a condition of their contract with RML, all contract security guards must successfully complete training which includes:

- Approximately 32 hours of basic curriculum training. This is the core security training where guards are instructed in handling emergencies, security patrol methods, firearms safety/handling, vehicle inspection techniques, security patrol methods, and search and seizure;
- Orientation training. The training focuses on post familiarization, the facility emergency plan, personnel identification, entry/exit control procedures, explosive detection machine operation, and the guard duty book logging; and
- Supervisory training. This training covers topics such as issuing verbal and written orders, record keeping, and managerial public relations.

Security personnel must complete refresher course training quarterly on the aforementioned topics. In addition, all security personnel must maintain a current certification related to first aid, cardiopulmonary resuscitation, and OSHA Standard 29 CFR 1910.1030, Occupational Exposure to Blood-borne Pathogens.

NIH police officers will be present at RML along with contracted security guards. All officers will be graduates of the Federal Law Enforcement Training Center's Mixed Basic Police Officer Training Program or of a Police Academy which meets the federal program criteria. NIH police officers at RML must also complete 40 hours of annual in-service training, a semi-annual training related to firearms, security, and supervision.

Laboratory Deliveries

All packages will be screened at the perimeter (using K-9 units, chemical sniffers, or X-ray) before entering the RML campus, and packages containing specimens, bacterial or virus isolates, or toxins will be opened only in a safety cabinet or other appropriate containment device.

Material Removal from Laboratory Areas

Biological materials/toxins for shipment will be packaged and labeled in accordance with all applicable federal, state, and local regulations (see **Appendix C***,* (Transportation and Transfer of Agents). Traditional laboratory biosafety guidelines emphasize good work practices; appropriate containment equipment; well-designed facilities; administrative controls to minimize risks of accidental infection or injury for workers; and administrative controls to prevent contamination of the environment outside the laboratory.

2.2.1.2 Pollution Prevention

Spill Prevention

RML has a Spill Prevention Control and Countermeasure (SPCC) plan that complies with Clean Water Act rules. The SPCC plan covers petroleum fuel stored in eight aboveground storage tanks at RML. EPA currently requires the plan to be reviewed every five years. The plan contains standard operating procedures for responding to spills of oil and hazardous substances and describes actions required for spill reporting, containment, and cleanup. The plan is reviewed and modified as necessary. RML has standard operating procedures in place and trained personnel to respond to spills. Eleven RML employees are trained as hazardous materials specialists and are part of RML's HAZMAT team. Members of the HAZMAT team are trained in toxicology, decontamination, spill containment, chemical characteristics, communication, and first aid. Specialists are accessible 24 hours per day, seven days per week for any spill incident that may occur at RML. Security staff is also trained to monitor the site for potential areas of concern, including accidental spills.

Response actions for fuel spills focus on protecting public health, safety, and the environment. Trained site personnel contain spills through use of berms and absorbent materials. The nature, extent, and magnitude of the spill is defined under the direction of the Montana Department of Environmental Quality (MDEQ).

RML has designated several storage areas with secondary containment to prevent releases to soil and water. Should a spill occur, HAZMAT personnel mobilize equipment to control the hazard and implement cleanup. Spill response supplies available at RML include absorbers, neutralizers, and sewer drain caps.

Hazardous Materials

RML is licensed by the U.S. Environmental Protection Agency as a small-quantity generator of hazardous chemicals and materials. Hazardous chemical wastes are accumulated on site in accordance with RCRA Subtitle C. The RML facility is registered with MDEQ under USEPA Hazardous Waste Management Identification Number # MT3750802875. Transportation and final disposition of stored hazardous waste is conducted by a licensed hazardous waste management contractor approximately once a year. The hazardous chemical storage area is located west of the main campus laboratory complex in a specially designed structure with secondary containment, spill alarms, and automatic fire suppression systems. The chemical waste storage structure is equipped with fire suppression systems, ventilation, and Class I Division 2 explosion-rated wiring.

RML is currently stressing waste minimization practices. Hazardous waste manifests show a declining trend in the disposal of hazardous waste from RML over the last few years. Waste minimization practices include ordering necessary laboratory chemicals in smaller quantities. Currently RML produces less than the 220 pounds of hazardous waste per month allowed for conditionally exempt, small-quantity hazardous waste generators.

Most hazardous materials used at RML are used in laboratory experiments. Most of the hazardous waste generated at RML can be grouped into categories based on their physical and chemical properties: toxic, flammable, or corrosive. Flammable compounds used in the greatest quantities at RML include acetone, acetonitrile, formamide, toluene, triethyl amine, and xylene. Corrosive compounds used in the greatest quantities by RML include acetic acid, formic acid, hydrochloric acid, potassium hydroxide, and sulfuric acid. Toxic compounds used in the greatest quantities at RML include formaldehyde, chloroform, phenols, and propylene glycol ether mixed with parafinic solvents.

RML periodically contracts with licensed hazardous waste transporters such as Safety-Kleen, Inc. or Burlington Environmental to haul wastes to licensed hazardous waste disposal facilities such as Safety-Kleen's facility in Argonite, Utah, or N.S.S.I. Recovery Services' facility in Houston, Texas.

A solid and hazardous waste specialist from the MDEQ inspected RML for its compliance with hazardous waste rules and regulations. A February 20, 2003, letter from MDEQ to Ms. Dianne Huhtanen at RML noted that no violations of applicable hazardous waste regulations were observed during the inspection.

Radioactive Materials

RML operates under a U.S. Nuclear Regulatory Commission (NRC) Materials License number 25-01203-01 which authorizes receipt, possession, location, and conditions for using radioactive materials. The RML Radiation Safety Committee and the radiation safety officer are responsible for supervision and regulatory compliance.

The CFR Part 20 specifies licensee requirements for radiation protection programs, including dose limits, storage, and control of licensed material, waste disposal, and record keeping. NRC conducted a safety and compliance inspection on May 8, 2002. The report stated that, based on inspection findings, no violations were identified.

RML's NRC license specifies amounts of various radioactive isotopes that may be in possession at any one time. Researchers must submit protocols for use of radioactive materials to the Radiation Safety Committee for approval. The protocol must specify names of users, isotopes, activity to be ordered, safety precautions, types of waste generated, procedures for handling waste, and actual scientific procedures performed. All scientific staff using isotopes are trained on topics including properties of ionizing radiation, safety procedures, proper handling techniques, NRC regulations, RML requirements, appropriate survey procedures, security, and record keeping.

The RML radiation safety officer tracks every isotope from the time of ordering until final disposition. Inventories of isotopes on hand are updated every month. In addition, RML has instituted a decay-in-storage program for radioactive waste of isotopes having less than a 120-day half-life. Each radioactive storage bag for solid waste or container for liquid waste must identify the specific isotope, date of storage, generator name, and activity. Waste disposal inventories that account for radioactive decay are updated monthly to show actual activity on hand for each waste unit.

The RML radiation safety policy emphasizes waste minimization. Final disposition of waste is conducted by the radiation safety officer or a designee. Extremely low levels of radioactive solid waste are incinerated. The EPA compliance code applied to RML incineration of radioactive waste has resulted in an exempt designation. Ash from the radioactive waste incinerator has been collected for storage, and disposal will occur according to NRC regulations. On one occasion a licensed broker has transported uranium and thorium waste compounds to the US Ecology Site for low-level radioactive waste in Washington. RML maintains a current site use permit at the Richland, Washington site to provide options for disposal of long half-life radioactive waste.

The NRC license for RML includes possession and use of a JL Shepherd Mark I, Model 30 irradiator containing a sealed source of cesium. This equipment is used to irradiate tissue culture cells or other biological specimens. Safety precautions include training, room monitor, monthly safety and interlock checks, and semi-annual leak tests.

Emergency Plan

Emergency plans for RML are periodically updated. Principal elements of the current plan include:

- evacuation;
- room clear;
- shelter in place;
- lockdown;
- dangerous person on site;
- suicide threat or attempt;
- death, serious injury or medical condition on site;
- fire or explosion;
- hazardous material spill;
- bomb or suspicious device;
- bomb threat; earthquake;
- civil disturbance;
- severe weather conditions;
- electrical outage;
- blood borne pathogen exposure;
- medical assessment procedure;
- emergency communications for use in extreme emergencies;
- radiation spill on body;
- chemical spill on body;
- biological spill;
- suspicious packages or mail;
- emergency evacuation of animal facility; and
- elevator failure.

Emergency plan revisions will involve the facility administration; Laboratory and Branch Chief; principal investigators; laboratory workers, and facility and NIH safety and security personnel. Local police, fire, and other emergency responders will be informed of the types of biological materials used in the laboratory and consulted in developing the revised emergency response plan.

NIH works closely with other government agencies to monitor intelligence regarding terrorist activities. The NIH also maintains an alert system that is based on the perceived threat to NIH's facilities. All NIH facilities, regardless of location, employ these security standards.

NIH has developed a comprehensive security plan that includes biological security. While exact details of the security plan are security-sensitive, NIH will use the most stringent security standards relating to physical security, background checks, intelligence gathering, and coordination with local, state and federal law enforcement agencies. Standard operating procedures will be developed in partnership with the RML, infectious disease specialist Dr. George Risi, the Ravalli County health officer, and local emergency response coordinator (as required by the Ravalli County Disaster and Emergency Operations Guideline).

The plan will be expanded to address facility-specific protocols for transporting injured or potentially infected personnel to emergency care facilities outside of the RML. Dr. Risi and NIH staff will review current agreements with emergency providers from other government and civilian laboratory facilities. A memorandum of understanding is planned with local emergency services and hospitals. The memorandum will outline RML's expectations in regard to the transportation, acceptance, admittance, and short- and long-term care of patients under various injury scenarios, including patients believed to be exposed to agents.

Incident Reporting and Protocols

The revised Emergency Response Plan will include provisions for notifying the Laboratory and Branch Chief, workers, safety personnel and other appropriate personnel, and the public in the event of an incident having the potential to impact the public. Policies and procedures will be in place for reporting and investigating incidents or potential incidents (e.g., undocumented visitors, infectious diseases, missing chemicals, unusual or threatening phone calls).

In the event of an incident, public communication will be facilitated by the Ravalli County public information officer in conjunction with the RML public affairs office, and in accordance with the Ravalli County Disaster and Emergency Operations Guide. The Health Department maintains a public health emergency communication system called the Ravalli County Health Alert Network (RCHAN) to inform the public of infectious diseases or environmental hazards. Targeted community contacts are informed by telephone, fax, and email. The public information officer at the county will communicate information and instructions through news releases to the media as needed.

2.2.2 Alternatives Considered But Eliminated From Detailed Study

This section describes alternatives to the Proposed Action that were eliminated from further review. These alternatives were identified during the public scoping process or by RML during review and analysis of the Proposed Action. These alternatives were considered technically infeasible, provided no environmental advantage over the Proposed Action or No Action, or would not meet the purpose and need.

2.2.2.1 Build the Integrated Research Facility in Bethesda, Maryland

Some comments suggested that the Integrated Research Facility should be built at the NIH campus in Bethesda, Maryland.

Rationale for Dismissing

Construction of the Integrated Research Facility at the Bethesda, Maryland campus would not meet the purpose "to provide a highly contained and secure intramural laboratory at RML dedicated to studying the basic biology of agents of emerging and re-emerging diseases, some of which have potential as bioterrorism agents.… in conjunction with "federal funding parameters associated with NIAID's intramural laboratory program." Bethesda, Maryland and Rockville, Maryland, are the only other intramural research facilities NIAID operates. A BSL-4 laboratory for NIH use has been constructed at the Bethesda site.

Locating the proposed Integrated Research Facility at either the NIH Bethesda or Rockville campuses is not prudent or practicable.

Based on the NIH Bethesda Master Plan, there are currently no available spaces on either campus capable of accommodating the Proposed Action.

All unoccupied sites have been developed or are otherwise allocated. Other areas of the campus approved for laboratory activities presently contain laboratory or service and support uses, which provide critical support space for other aspects of the NIH mission. These facilities cannot be relocated until suitable replacement space can be provided, a process estimated to require more than a decade to complete. Developing the Proposed Action within the footprints of these structures is not realistic.

Issues addressed through this alternative are also addressed through the No Action Alternative.

2.2.2.2 Relocate Rocky Mountain Laboratories to a Less Populated Area

Several commenters suggested that NIH/NIAID relocate RML to another, less populated site. The commenters noted that relocation of RML would avoid potential impacts posed by biological and infectious agents studied at RML.

This alternative would eliminate some of the consequences of the Proposed Action (such as additional traffic, construction noise, and increased water consumption associated with the Integrated Research Facility), and the effects would be the same as the No Action Alternative described in Chapter 4.

Rationale for Dismissing

To relocate RML to a less populated area would require NIH to obtain land; plan, design, construct, and commission new facilities that meet programmatic needs, requisite codes, and requirements; and obtain needed local, state, and federal permits. A new facility would require adequate and reliable utility and infrastructure services (water, sewer, power, roads) and access to reliable transportation and shipping services. Relocation of existing government staff and family members, secure adequately trained contract and repair services, recruitment of new staff to a more remote area, and provisions for schools for family members would be required. Relocation would necessitate decommissioning and closure of the present RML facility. Relocation would take approximately 15 years and cost nearly $1 billion.

The cost of building the proposed facility at a different location was determined by considering the total costs for not only the facility, but also for the structure needed to support the facility that currently exists at the RML. These costs included the following:

- Site location and site purchase ($9.84M);
- Site development/ utility infrastructure ($297.13M);
- Research facilities including the proposed BL-4 facility and the adjacent existing BL3 that will support the BL-4 ($167.7M);
- Research support facilities that currently exist at the RML and will be used to support the BL-4 ($47.86M);
- Emergency response service ($20.75M); and
- Additional staffing that will be available at the RML available to support the BL-4 ($2.5M) and other additional costs including transportation and contracted services ($11.35M).

The total cost of these services is approximated at a total of $920.18M. The length of time to provide a facility at the alternate location would be 15 years. Cost and time ultimately make the alternative unreasonable.

The highly trained and specialized staff at RML would not likely transfer en-masse, increasing the time needed to attain current levels of research performed at RML.

This alternative does not meet the purpose and need "to provide a highly contained and secure intramural laboratory at RML dedicated to studying the basic biology of agents of emerging and re-emerging diseases, some of which have potential as bioterrorism agents.…" in conjunction with "federal funding parameters associated with NIAID's intramural laboratory program." Congress has authorized expenditure of $66.5 million for construction of an Integrated Research Facility through NIH's Intramural Laboratory Program. Construction of the facility at an alternate site would require new funding to provide infrastructure and research laboratory support currently in place at RML.

This alternative is also outside the scope of the Project (see Decision to Be Made on page 1-7).

This alternative is represented by the No Action Alternative (which includes not building the

Integrated Research Facility at RML). An alternative such as this could be considered in a future NEPA analysis, regardless of which alternative is selected under this project.

2.2.2.3 Construct Integrated Research Facility at Alternate Location

Other commenters suggested that the proposed Integrated Research Facility containing the BSL-4 laboratory be constructed at a more remote site away from Hamilton, at a military base, or somewhere with an existing infrastructure. These commenters suggested the relocation of the BSL-4 laboratory would avoid potential impacts posed by biological and infectious agents studied at RML, or that these other areas might be more easily protected from terrorist attack. This suggestion was also made in several comments on the DEIS and SDEIS.

This alternative would also eliminate some of the consequences of the Proposed Action, and the effects in Hamilton and Ravalli County would be the same as the No Action Alternative described in Chapter 4.

Rationale for Dismissing

A key component of the studies in the proposed Integrated Research Facility involves integration of current RML scientists with those working in the new facility. Locating the BSL-4 laboratory at a separate location from the existing RML campus would eliminate the connected research on projects that use BSL-2 and BSL-3 facilities, making research inefficient and impractical.

This alternative also fails to meet the purpose "to provide a highly contained and secure intramural laboratory at RML dedicated to studying the basic biology of agents of emerging and re-emerging diseases, some of which have potential as bioterrorism agents. … "in conjunction with "federal funding parameters associated with NIAID's intramural laboratory program." A site other than at NIH would have to either be purchased or go through the lengthy federal and state permitting processes. Utilities, roads, and other infrastructure or services would be necessary to support the facility.

Issues addressed through this alternative are also addressed through the No Action Alternative. An alternative to locate an Integrated Research Facility at an alternative location could be considered in a future NEPA analysis, regardless of which alternative is selected under this project.

2.2.2.4 Construction and Administration of Integrated Research Facility Be Conducted By Another Agency, or at Another NIH Location

Commenters suggested that the Integrated Research Facility should be authorized and operated by another agency, not NIH, or that it should be constructed as part of a different facility operated by NIH. Some of the alternative locations mentioned were NIH at Bethesda, Maryland, or Ft. Detrick, Maryland.

Rationale for Dismissing

NIH has no authority to direct other agencies to construct an Integrated Research Facility. Legislation approved by Congress and the President is needed to construct a research laboratory building. Actions by other agencies related to BSL-4 laboratory construction are outside the scope of this EIS.

Construction and administration of the proposed Integrated Research Facility at RML in Hamilton by another agency, private group(s), or at different NIH facility would not meet the purpose "to provide a highly contained and secure intramural laboratory at RML dedicated to studying the basic biology of agents of emerging and re-emerging diseases, some of which have potential as bioterrorism agents.…" in conjunction with "federal funding parameters associated with NIAID's intramural laboratory program." Bethesda, Maryland, already has a BSL-4 laboratory. Fort Detrick, Maryland, is operated by the U.S. Army. NIH has just completed an EIS on a BSL-4 facility at Fort Detrick planned for NIAID.

Issues addressed through this alternative are also addressed through the No Action Alternative.

2.3 AGENCY'S PREFERRED ALTERNATIVE

After reviewing the potential effects of the alternatives (**Table 2-2**) along with the purpose and need for the Project, NIH has identified the Proposed Action as the preferred alternative.

2.4 SUMMARY COMPARISON OF ALTERNATIVES

Table 2-2.
Comparison of Alternatives

Purpose and Need	Proposed Action	No Action
Provide a highly contained and secure intramural laboratory at RML dedicated to studying the basic biology of agents of emerging and re-emerging diseases, some of which have potential as bioterrorism agents.	The Proposed Action meets the purpose of the Project.	No action does not fulfill the purpose of the Project.
Issue	**Proposed Action**	**No Action**
Housing	The adjacent neighborhood could encounter direct negative impacts during construction of the Integrated Research Facility from noise and dust for two years. New housing units would be needed within commuting distance.	Additional annoyances of the construction phase would be eliminated. Housing starts would continue at about the same pace, although houses may remain on the market longer with fewer qualified buyers.
Education	School capacity is adequate for new growth, especially since school-aged populations are decreasing, but operating and maintenance costs would continue to increase.	No change in school enrollment.
Community Safety	No increased risk to the community.	Negligible risk to the community.
Transportation	RML traffic expected to increase total traffic by 16% during peak hours by 2006; residential traffic would make the increase a total of approximately 20%.	Residential traffic is expected to increase approximately 4% by 2006.
Economic Resources Income	100 new employees with total annual payroll estimated at \$6.6 million. RML would contribute a total of \$17 million in payroll annually.	No new employees, total annual payroll would remain at \$10.4 million.
Government and Public Finance	Public finance revenues would increase as a result of increased income tax on the Integrated Research Facility-related construction and operations payrolls, as well as the incomes of spouses and older children of RML employees, increased vehicles being licensed, and property tax revenues based on the additional new homes and increased property assessments.	No increase in tax revenues from the Integrated Research Facility.

**Table 2-2.
Comparison of Alternatives**

Issue	Proposed Action	No Action
Noise	Noise from the Integrated Research Facility would be in the 35-50 dBA range at the property lines when all equipment is operating. Construction activities associated with the Proposed Action would generate intermittent short-term noise impacts. Overall noise level would remain at the current 44-58 dBA until reasonably foreseeable improvements are made to reduce them to 55 dBA at the property lines, which is the draft noise guideline for RML.	Existing noise would range from the current 44 to 58 dBA with the steam vents and incinerator operating and 43 to 61 dBA with the emergency generator operating, until reasonably foreseeable improvements are made to reduce them to 55 dBA at the property lines, which is the draft noise guideline for RML.
Visual Quality	A general improvement of the appearance of the site, due to the Proposed Action and cumulative effects.	No effect due to no action. Cumulative effects are a general improvement of the appearance of the site.
Historical Resources	No adverse effect.	No adverse effect.
Air Quality	Construction activities associated with the Proposed Action would generate short-term air impacts. Operation of the Integrated Research Facility increases the activity level at the laboratories and related emissions from the facility. Applicable air quality standards would be met.	Emissions from RML would remain at current levels. Applicable air quality standards would be met.
Water	Water consumption at RML would increase by up to 35 percent. Wastewater discharge at RML would increase by about 30 percent. Both water supply and wastewater treatment in Hamilton can adequately handle this increase.	No increase in water or wastewater.

CHAPTER 3
AFFECTED ENVIRONMENT

3.1 INTRODUCTION

Existing environmental resources in the Project area are described in this chapter with a summary of environmental baseline information. In the following sections, "Project area" refers to the Proposed Action, and "study area" refers to land surrounding RML. The "area of potential effect" as used in the Historical Resources section refers to the Project area.

The USDHHS manual (30-50-00 NEPA Review) requires the EIS to incorporate the material required by the applicable statute or Executive Order. Those assets that may be affected are addressed in this chapter.

The following resources are potentially affected by the Proposed Action and are addressed in detail:

- Social Resources;
- Economic Resources;
- Noise;
- Visual Quality;
- Historic Resources;
- Air Quality; and
- Water Supply and Wastewater.

The following resources have been analyzed and are either not present in the Project area or would not be affected by the Proposed Action:

- Soil;
- Geology;
- Floodplains;
- Wetlands and Riparian areas;
- Vegetation;
- Fish;
- Wildlife;
- Threatened and Endangered Species;
- Environmental Justice; and
- Surface Water.

Rationale for providing no further discussion of the resources is also included in this chapter.

3.2 SOCIAL RESOURCES

3.2.1 Analysis Methods

The socioeconomic study area includes Ravalli County and the City of Hamilton. Data for the State of Montana and the United States are used where appropriate for comparison purposes.

Baseline data for Hamilton and Ravalli County include population and demographic data, land, community infrastructure information, and current economic and business statistics. Data were collected to comprehensively describe existing conditions for both the county and the city. Data contain current population statistics from the U.S. 2000 Census, including age categories and education levels. Existing land use is described using the Ravalli County Growth Policy (2002), City of Hamilton Comprehensive Master Plan (1998), and the draft City of Hamilton Growth Policy (2002). Housing information includes number of units, vacancy rates, costs, and cost-burden derived from U.S. 2000 Census reports, Ravalli County Growth Policy, and City of Hamilton's Comprehensive Master Plan. Economic information includes employment by industry, labor force, income, and public finance. Data were collected primarily from the U.S. 2000 Census, the Montana Department of Labor and Industry, and the Ravalli County Economic Needs Assessment (Swanson 2002).

3.2.2 Affected Environment

Ravalli County was established in 1893 and named for Jesuit Missionary Father Anthony Ravalli, who settled in the region in 1845. County residents value the rural character of living close to nature and have a strong concern about the fate of the area's land, natural resources, local businesses, and quality of life.

The City of Hamilton, the largest community in Ravalli County, was incorporated in 1894 and named after James Hamilton, a Marcus Daly employee who platted the town along the route of the Northern Pacific Railway in 1890. Hamilton was a company town revolving around the activities of Daly's large lumber mill, owned by the Anaconda Copper Mining Company, and Bitterroot Stock Farm. Most of the residents worked for the Daly interests, living in company homes and shopping in company stores. By the time Daly died in 1900, Hamilton was the commercial center of the Bitterroot Valley and the seat of Ravalli County.

Population Trends and Demographic Characteristics

Ravalli County is one of Montana's fastest growing counties. It was one of the fastest growing counties in the U.S. during the 1990s. In the last decade, net in-migration resulted in more than 10,500 new residents to the valley, an increase of 44.2 percent in 10 years. Hamilton is one of the fastest growing communities in Montana as well. The population increased from 2,737 in 1990 to 3,705 in 2000, a net increase of 35 percent during the 10-year period. In comparison, Missoula County, the region's main population center, grew 21.75 percent, and the state's population growth was 12.9 percent from 1990 to 2000 (**Table 3-1**). Ravalli County is growing faster than Hamilton. In the 1960s, Hamilton's population was 20 percent of the county; in 2000, it was only 10 percent of the county.

According to the Ravalli County Economic Needs Assessment (Swanson 2002), "about 95 percent of this recent population growth is the result of much higher rates of net in-migration to the county (which considers only new residents who have declared Ravalli County as their permanent residence)."

Many of the newcomers visited and decided to relocate to the area. Others are previous residents returning to the area, retirees, and in-migrants from nearby Missoula, which continues to grow as the regional employment and retail center. High rates of net in-migration have developed in many areas of the interior west, as people move to take advantage of the area's quality of life and proximity to National Forests and outdoor recreational opportunities. The valley has good access to airline service and to cultural and social activities in Missoula. A low crime rate and moderate climate enhance the area's desirability.

The Ravalli County population (**Table 3-2**) aged between 1990 and 2000, with large increases in the 45-64 year-old age group. The 65 and older group decreased as a percentage of the total population. Median age of county residents was 41.1 years in 2000, up from 37.8 years in 1990. The median age for the state's population in 2000 was 37.5 years. Aging of the population is expected to increase and continue to be a demographic factor, producing a lower birth rate. In 1980, the birth rate was 15.8 per 1,000, falling to 9.8 by 2000. This compares to a statewide average of 13.8 (US Census 2001).

The school population is growing more slowly than the general population. The Ravalli County Economic Needs Assessment (Swanson 2002) points out that new in-migrants to Ravalli County are people in their 40s, 50s, and 60s who are not adding to their families. If they have children still at home, they are likely high-school age and older. Education levels attained in the county match those of the state and the City of Hamilton in the percent of high school graduates, but both the county and the city have lower rates of college and graduate or professional degree holders than does the state.

Table 3-1.
Population Estimates

Area	2001 Census Estimates	2000 Census	1990 Census	% Increase 1990 -2000	% Increase 2000 - 2001
Montana	904,433	902,195	799,065	13%	2%
Ravalli County	37,304	36,070	25,010	44%	3%
Hamilton	NA	3,705	2,737	35%	NA

Source: Montana Department of Labor and Industry 2002.

Table 3-2. Demographic Characteristics, 2000

Demographic Characteristic	Montana	Ravalli County	City of Hamilton
Total population	902,195	36,070	3,705
Gender			
Male	449,480	17,910	1,672
Female	452,715	18,160	2,033
Age Group			
0-4	54,869	2,073	220
5-9	61,963	2,477	184
10-14	69,298	2,863	215
15-19	71,310	2,662	201
20-24	58,379	1,379	181
25-34	103,279	3,570	412
35-44	141,941	5,340	479
45-54	135,088	5,854	445
55-59	47,174	2,313	152
60-64	37,945	1,950	167
65-74	62,519	2,981	348
75-84	43,093	1,949	425
85 and over	15,337	659	276
Median Age	37.5	41.1	44.3
Education (population 25 and over)			
< High School graduate	75,358	3,095	482
High School (or GED)	183,415	7,738	860
Some college, no degree	150,467	6,916	708
Associate degree	34,420	1,284	82
Bachelor's degree	100,758	3,897	423
Post Graduate	42,203	1,631	175

Source: US Census 2001.

3.2.3 Housing

Ravalli County

According to the 2000 U.S. Census, there were 15,946 housing units in Ravalli County, almost eight percent of which were multiple family units. Over 75 percent of the housing is owner-occupied, with an average of 2.48 people residing in each household. The Ravalli County Growth Policy, adopted in December 2002, notes that providing quality affordable housing is a primary community goal. According to the policy, a household is described as experiencing "cost-burden" when their housing costs exceed 30 percent of income. In 1990, the U.S. Census indicated that 16 percent of homeowners and more than 34 percent of renters were experiencing cost-burden. In 2000, these figures had increased to almost 29 percent of homeowners and 38 percent of renters. The rate of growth in household income has not kept pace with the cost of homes in Ravalli County. Between 1990 and 2000, median household income increased from $28,376 (adjusted for inflation to 2000 values) to $31,992, or 12.7 percent. In contrast, the median home value was $82,923 in 1990 (adjusted for inflation to 2000 values) and increased to $133,400 in 2000, an increase of 60.9 percent and about 134 percent of the Montana median home value of $99,500.

Hamilton

Within the city limits, 80 percent of the area is built out, with less than 15 percent vacant land remaining. The 2000 U.S. Census reports there were 1,915 housing units in the city. Of the 1,772 occupied housing units, 51 percent were owner-occupied, with 49 percent renter-occupied. On average, 1.95 persons live in each household, indicating smaller households than in the county, consistent with the higher median age of city residents. The vacancy rate is approximately four percent for homeowners and six percent for rentals. The 1998 City of Hamilton Comprehensive Master Plan states that Hamilton has a jobs-to-housing balance of 300 jobs for every 100 units of housing. The vacancy rates suggest that a substantial percentage of those employed in Hamilton do not live in the city. It is not clear whether that is by choice or necessity; some employees may live out of town for more affordable housing. Local realtors report that home prices in Hamilton currently range from $95,000 to $185,000 and that homes near RML are worth between $20,000 and $30,000 more than away from RML.

RML is located in a residential area of Hamilton. Some current residents report that the facility is not a good neighbor because of high noise volumes, steady traffic, and parking conflicts. They also note that the facility has not been maintained, with no landscaping or yard maintenance (see the Visual Quality and Noise sections in Chapter 4).

The City of Hamilton has zoned the area around RML as a Public and Institutional (PI), which is intended to "accommodate those public and institutional uses which are related to the health, safety, educational, cultural, and welfare needs of the city." The zone recognizes "government owned and operated facilities" and "other similar uses which the city finds to fall within the intent and purpose of this zone, that will not be more obnoxious or materially detrimental to the public welfare or to the property in the vicinity of the uses, and which the city finds to be of a comparable nature and of the same class as the uses enumerated" (Section 17.92.010, City of Hamilton Zoning Code). As a federal facility, RML is not obligated to follow local zoning regulations. The draft Hamilton Growth Policy (2002) confirms uses in the district.

3.2.4 Education

There are 16 public schools in Ravalli County with a total enrollment of approximately 6,280 pupils. Of the 16, there are six high schools, one middle school, seven elementary schools, one primary school, and one unclassified.

Enrollment in the PK-12 schools in the Hamilton District is approximately 1,612 (US Census 2002a). Higher education in the region includes the University of Montana and its College of Technology, both in Missoula. The Hamilton school superintendent reports that the middle school and high school have sufficient capacity to handle up to 100 new students. The elementary schools are at capacity; however, another facility is available, if necessary (Lyons 2003).

3.2.5 Community Safety

Law Enforcement

Law enforcement in Ravalli County is provided by the Montana Highway Patrol dispatched out of Missoula; the Ravalli County Sheriff's Department; and local police departments in Hamilton, Stevensville, Darby, and Pinesdale.

The Ravalli County Sheriff's Department has 31 full-time sworn officers, approximately 31 reserve deputies, 19 full-time sworn detention officers, 11 administrative and jail staff, 11 dispatchers for 911, and a disaster and emergency services coordinator. The Sheriff's Department uses a reserve deputy sheriff force and a trained group of volunteers for search and rescue activities.

The City of Hamilton Police Department has 13 sworn officers, one non-sworn full-time employee, and one part-time, non-sworn employee. The sworn officers include the chief, a sergeant, two detectives, eight patrol officers, and an animal control/parking enforcement officer.

RML currently has contracted security guards on site at all times. An NIH police force has been established at RML. A full-time captain has been hired and is currently on site, and a Sergeant was hired in January 2004.

Fire Protection

Fire protection services are supplied by 12 volunteer fire departments, with approximately 155 volunteer firefighters located throughout the Bitterroot Valley. The Hamilton Fire Department has 28 volunteer firefighters and five fire engines, one aerial truck capable of handling fires above the second floor of a building, and three water tenders. Three certified HAZMAT responders on the Fire Department work at RML and are also members of the Missoula Regional HAZMAT Team, a 40-person team available to RML to provide emergency services (Wilson 2003). In addition, RML has its own 11-member HAZMAT team.

During major fire and emergency situations that exceed the capacity of local departments and response units, the Ravalli County disaster and emergency services coordinator offers assistance to develop combined plans and actions.

Health Care

The Marcus Daly Memorial Hospital in Hamilton is the only hospital in Ravalli County. Marcus Daly cannot handle more than 10 emergency patients at a time (Bartos 2003). The 48-bed acute care facility offers 24-hour emergency care. Ambulance services are provided by Bitterroot Valley EMS (Emergency Medical Services), which currently has eight ambulances and 102 people on staff. A full range of specialty medical services are available in Missoula.

3.2.6 Transportation

Other than general city ordinances and laws, no special restrictions on traffic or parking exist for the RML campus.

Regulations concerning transportation of biological agents are aimed at ensuring that the public and workers in the transportation chain are protected from exposure to any agent in the package. Transportation of biological agents is regulated by the Public Health Service, Department of Transportation, United States Postal Service, the International Air Transport Association, and the Occupational Health and Safety Administration. Transportation of the various agents currently studied at RML or potentially studied in the Integrated Research Facility is described in detail in **Appendix C**. RML is currently meeting requirements for transporting biological agents.

Information for the transportation analysis was gathered from the Hamilton Transportation Plan 2002 (Morrison Maierle, Inc. 2002). Existing traffic counts were used and base traffic projections were developed through historical roadway growth rates. Existing land use characteristics were used, and forecast land use projections were developed through interviews with city staff and historical population data from the U.S. Census Bureau.

Investigation of accident records for the past three years indicates that, in general, accident rates for Hamilton City collector streets have been average. Nearly 69 percent of the recorded collisions occurred on U.S. Highway 93; 16 percent occurred on a four-block section of Main Street (Morrison Maierle, Inc. 2002).

The four traffic signals in Hamilton (three on U.S. Highway 93 and one on Main Street) are functioning adequately or have been scheduled for upgrades in the near future. Currently, new signals may be warranted at two locations on U.S. Highway 93, one at Pine Street and another at Ravalli Street (seven blocks and three blocks north of RML, respectively).

Near RML, 7th and 4th streets are local collector streets, while the remaining streets in the area are considered residential. Both types of streets function primarily as access to abutting properties, with typically low traffic volumes. They carry less than 1,000 vehicle trips per day (Morrison Maierle, Inc. 2002).

Traffic into RML currently enters through the main gate at the corner of 4th and Grove streets (see Figure 2-1). During periods of heightened security, when vehicles entering the campus must be searched, traffic congestion is a problem as employees arrive for work. Many choose to park their vehicles along city streets instead of on campus, which causes parking problems near the site. Adequate visitor and employee parking is currently available without using adjacent streets.

The Hamilton Transportation Plan recommended that 7th Street from Adirondac Avenue to Desta Street (near RML, see Figure 2-1) have pavement replaced and curbs, gutters, and sidewalks upgraded to provide added capacity, improve surface drainage, and provide dedicated residential parking areas and dedicated pedestrian/bicycle facilities.

3.3 ECONOMIC RESOURCES

Ravalli County has experienced several boom/bust economic cycles based first on fulfilling the timber needs of the mines in Butte and Anaconda and then on orchard agriculture that relied on extensive irrigation systems. By 1915, easily accessible timber had been cut and the sawmill closed. In 1917, financial problems of the "Big Ditch" had peaked, and the orchard business went bust. The local economy was depressed and uncertain until RML was established in 1927 to research the cause of Rocky Mountain spotted fever. Hamilton actually grew during the 1930s when the rest of the country was experiencing a depression. Ravalli County and Hamilton are currently experiencing another economic boom because of the rapid population growth, apparently spurred by urban professionals wanting a rural, outdoor quality of life.

According to the Ravalli County Economic Needs Assessment (Swanson 2002), the economy is increasingly "growth driven" and "growth dependent," with most employment and income growth associated with people moving to the area and the resulting real estate development and construction activity. Concerns exist that high levels of population growth cannot be maintained indefinitely because the growth is based on the attractiveness and desirability of the area, highlighting the volatility of the current economic situation. The Ravalli County Growth Policy (2002) lists major goals of encouraging economic growth in order to provide both good pay and good profit, and supporting the Ravalli County Economic Development Authority. The City of Hamilton Draft Growth Policy (2002) lists protecting the rural way of life without neglecting economic growth as a major community goal. The Ravalli County Economic Needs Assessment (Swanson 2002) lists developing quality businesses and job growth as one of three points of an economic development strategy by:

- Increasing the number of good paying jobs for skilled and educated workers with jobs paying above the area average; and
- Increasing the number of jobs that can serve as "ladders" for elevating area workers from low paying, low-skill jobs.

The report specifically identifies the bioresearch and biotechnology fields.

3.3.1 Employment

Along with the influx of population during the 1990s came a construction boom that has kept many contractors in the Bitterroot Valley actively engaged in building homes and commercial developments. In addition to construction activities, much of the boost in the valley's economy has been in services (2,242 employees) and retail trade (2,086 employees) (**Table 3-3**). According to the Ravalli County Economic Needs Assessment (Swanson 2002), growth in the service sector outpaces employee and income growth in any other sector. Not only are the jobs increasing, but the pay is also getting better, probably due to the increase in health services jobs. Retail trade is also growing because of the "growth driven" economy.

Despite losses in agricultural land over the last 10 years, agricultural production in Ravalli County remains strong. According to 2000 USDA County Profile, Ravalli County ranks second (out of 56 Montana counties) in dairy production, seventh in hay production, eleventh in oat production, thirteenth in alfalfa production, and above average in production of beef cows and heifers, cattle, sheep and lambs, and pigs.

The top 10 private employers in Ravalli County are Albertson's, Corixa, Discovery Care Center, Farmers State Bank, Fox Lumber Sales, Marcus Daly Memorial Hospital, Rocky Mountain Log Homes, Selway Corporation, Stock Farm Club, and Valley View Estates Health Care Center (Montana Department of Labor and Industry 2001).

Government employment is especially important to Ravalli County because it is a steady source of outside dollars coming into the county, thereby contributing to the economic base. Each economic base dollar generates about two dollars (Swanson 2002), whereas dollars earned from inside the community generate only one dollar. Employment at public schools, RML, and the U.S. Forest Service make up the majority of government jobs.

**Table 3-3.
Ravalli County Employment by Industry**

Industry	Average Annual Employed	Annual Wages Paid
Agriculture, Forestry, Fish	311	$ 5,213,462
Mining	4	$ 142,609
Construction	659	$ 15,587,371
Manufacturing	1,129	$ 33,360,408
Transportation, Communications, and Utilities	345	$ 8,413,587
Wholesale Trade	313	$ 9,595,714
Retail Trade	2,086	$ 28,058,822
Finance, Insurance, and Real Estate	445	$ 11,402,785
Services	2,242	$ 45,496,603
Nonclassifiable	12	$ 456,537
Private Business	**7,552**	**$157,498,717**
Government	1,782	$ 50,897,183
Total All Industries	**9,334**	**$208,395,900**

Note: Totals may not agree due to nondisclosure of confidential industry data or to rounding.

Source: Montana Department of Labor and Industry 2002.

In 1990, the last period for which data was published, an estimated 15 to 20 percent of employed Ravalli County residents commuted to work in Missoula County. Over three percent of all employees in Ravalli County commuted from Missoula County (Montana Department of Labor and Industry 2002).

The unemployment rate of Ravalli County has been higher than the state rate since 1990, ranging from 10.8 percent in 1991 to a low of 4.6 percent in 2001. The state unemployment rate in 2001 was also 4.6 percent (**Table 3-4**).

3.3.2 Income

Personal income is defined as all income received by individuals from all sources – income from work (labor income or earnings), income from savings and investments (investment income), and income from outside sources such as Social Security or Medicare (transfer payment income). The Ravalli County economy has undergone an important shift in its income base as a result of the population and demographic dynamics of the 1990s. According to the Ravalli County Economic Needs Assessment (Swanson 2002), investment income and transfer payment income grew during this period while labor earnings saw gain. Labor earnings accounted for less than 54 percent of all personal income in the county in 2002; non-labor income is expected to increase to over half of the total income by 2010. Labor earnings account for about 60 percent of personal income in Montana and for about 65 percent of all income in the nation. The Ravalli County Economic Needs Assessment (Swanson 2002) notes that the greatest deficiency in the area's economy is the relatively low level of per worker earnings, both for wage and salaried employees and for proprietors (**Table 3-5**).

Table 3-4.
Ravalli County Annual Average Labor Force

Year	Labor Force	Unemployed	Unemployment Rate
2001	18,163	840	4.6%
2000	18,272	950	5.2%
1999	17,730	1,072	6.0%
1995	15,973	966	6.0%
1991	12,251	1,328	10.8%

Source: Montana Department of Labor and Industry 2002.

Labor income is income from work or earnings. Average annual wages for all Ravalli County industries ($22,326) in 2000 lagged behind the state ($24,275) by approximately nine percent. The mining sector in Ravalli County, although employing an average of only four employees in 2000, paid the highest wage in the county at $36,652, while the retail trade section paid the lowest average annual wage of $13,451 (Montana Department of Labor and Industry 2001). Government workers (federal, state, and local, including public education) constituted 19 percent of the total workforce, earning an average annual wage of $28,562.

RML has approximately 250 federal employees, fellows, and facility contractors (not including construction workers) and an annual payroll of $10.4 million for fiscal year 2003.

Per capita income (**Table 3-5**) is calculated by dividing all personal income received by all permanent county residents by the total county population. Per capita income was listed as $16,560 in 1997, an 11 percent gain over the 1987

Table 3-5.
Comparison of Per Capita Personal Income, 1970-2000

Year	U.S.	Montana	Montana % of U.S.	Ravalli County	Ravalli County % of U.S.	Ravalli County % of Montana
2000	$29,469	$22,518	76%	$18,959	64%	84%
1995	$23,255	$18,592	80%	$16,036	69%	86%
1990	$19,572	$15,516	79%	$13,660	70%	88%
1980	$10,183	$ 9,143	90%	$ 7,507	74%	82%
1970	$ 4,095	$ 3,625	89%	$ 3,029	74%	85%

Source: Montana Department of Labor and Industry 2002.

level. The latest estimate is $17,235 for 2000, a four percent gain over the 1997 level. Montana is ranked 47th in personal per capita income in the nation, and Ravalli County is 35th of the 56 counties in the state (US Census 2002a).

Poverty levels indicate the percentage of the population with incomes below that necessary for basic necessities – adequate housing, food, transportation, energy, and health care. The 2000 U.S. Census reports that 13.8 percent of Ravalli County residents were classified as living in poverty, based on the national poverty threshold. At the same time, poverty levels were estimated at 14.6 percent of the state's population and at 11.8 percent of the nation's population.

3.3.3 Government and Public Finance

According to the Ravalli County Economic Needs Assessment (Swanson 2002), the high rate of population growth is causing economic restructuring in the county. The report presents evidence that in the midst of this fast growth, local government officials are hard pressed to meet the growing demand for services that rapid population and other growth brings with the constrained revenues available. In Ravalli County, both taxing and spending for local governments and special districts are low.

The two primary sources of local government revenues are intergovernmental transfers (funds passed through from federal and state governments, such as grants-in-aid and payments in lieu of taxes for federally owned land) and local taxes and assessments. The Ravalli County Economic Needs Assessment (Swanson 2002) notes that, in 1997, total revenue for local governments in Ravalli County was $45 million (1997 is the last year for which data has been reported). Of that total:

- Intergovernmental transfers accounted for $22.4 million, or 50 percent of the total;
- Taxes accounted for $16.3 million, or 36 percent; and
- Sales, fees, and earnings accounted for $6.3 million, or 14 percent.

Of the $16.3 million collected in taxes, $15.7 million was collected as property tax. While property taxes (**Table 3-6**) are low in Montana compared with other mountain west states, they are not low for individual owners and commercial establishments, and they are rising faster than per capita incomes.

Table 3-6.
Taxable Values, Ravalli County

	1987	1994	2000
Residential	57.8%	63.9%	69.5%
Commercial	9.5%	11.1%	13.4%
Subtotal	67.3%	75%	82.9%
Taxable Values	$28,400,000	$40,700,000	$49,000,000

Source: Nicholson 2002.

The Montana Legislature lowered rates on utilities and business equipment, placing almost 83 percent of the tax burden in Ravalli County on residential and commercial property owners. Assessed property values almost doubled, and property tax bills more than doubled, as special districts such as fire departments and schools raised their mill levy requests in an attempt to maintain cuts from the state share of taxes. Local wages, which pay these taxes, have not increased at the same pace.

3.4 NOISE

There are no local, state, or federal noise ordinances in effect for the area. However, RML has drafted guidelines to limit noise levels due to its operations (**Table 3-7**).

A noise level study of the current operation was conducted in May 2003 (Big Sky Acoustics 2003). Measurements were conducted at 13 locations (**Figure 3-1**). Measurements were taken with equipment operating, including the emergency generator, boiler steam vent, and/or the incinerator. Information concerning testing methods is available in the Final Noise Analysis Report in the administrative record.

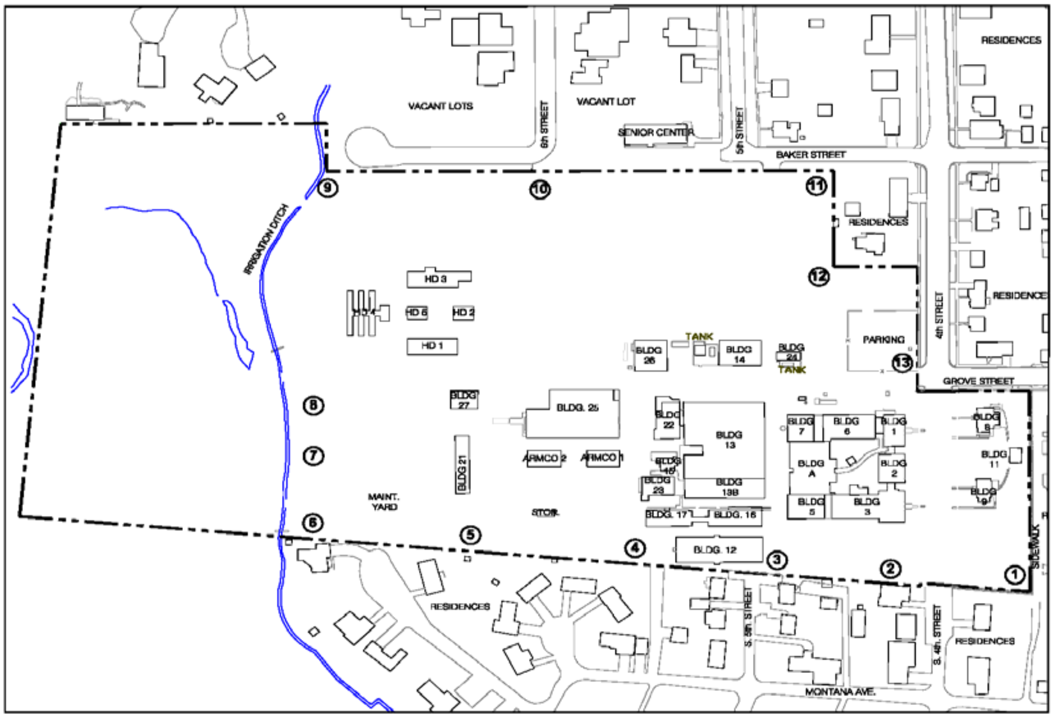


Figure 3-1. Ambient Noise Levels for Table 3-8.

Table 3-7.
RML Campus Noise Guidelines

Noise	Daytime[1]	Nighttime[1]
Cumulative	55 dBA	50 dBA
Tonal[2]	50 dBA	45 dBA
Emergency Generator[3]	60 dBA	NA

1. Daytime 7:00 am to 7:00 pm, nighttime 7:00 pm to 7:00 am
2. Audible discreet tones shall be identified when the noise level in one-third octave-band frequency exceeds the arithmetic average of the levels in the two adjacent one-third octave band frequencies by 15 dB or more at frequencies below 125 Hertz, by 8 dB or more between 160 and 400 Hertz, and by 5 dB or more at frequencies equal to or greater than 500 Hertz.
3. During weekly testing of emergency generators, noise shall not exceed 55 dBA, and the combination of the generator and other campus equipment noise shall not exceed 60 dBA. Emergency generators will only be tested during daytime hours.

Table 3-8.
Existing Ambient Noise

Location[1]	Daytime	Nighttime
1	48	45*
2	52	50*
3	52	51
4	51	50*
5	50	45*
6	44	40*
7	41	40*
8	44	40*
9	43	39
10	50	44
11	46	45
12	47	45*
13	49	45*

1 See Figure 3-1 for locations.
* Nighttime ambient levels that were estimated.

The study results indicated that existing ambient noise levels at the property line ranged between 41 and 52 dBA during the daytime and between 39 and 51 dBA at night (**Table 3-8**), which is considered faint to moderately loud (**Table 3-9**). Since the study was completed, noise reduction features have been installed, including putting a silencer on the incinerator stack, enclosing the incinerator cooling tower, muffling the steam plant, and muffling the generator buildings. These actions have reduced the noise emitted from the RML campus.

Table 3-9. Perception of Noise

Noise Level (dBA)	Noise Source	Subjective Evaluation
70	Vacuum cleaner 10 feet away or outdoors in a commercial area	Loud
60	Normal speech 3 feet away	Moderate
50	Typical office activities or background noise in a conference room	Moderate
40	Library background noise, quiet suburban environment at night, or typical background noise in a residence	Faint
30	Whisper 3 feet away or quiet rural environment at night	Faint
21	Concert hall background noise	Very faint
10	Human breathing	Very faint
0	Threshold of hearing or audibility	

Sources: Big Sky Acoustics 2002.

3.5 VISUAL QUALITY

The objectives of the visual resources investigation are to identify and describe visual resources that could be affected by the proposed expansion and related facilities. A viewpoint was selected for evaluating the visual characteristics presented in Chapter 4, Visual Quality. Factors considered in selecting the viewpoint included angle of observation, number of viewers, duration of view, relative apparent size of project, and lighting conditions. Viewpoint 1 was selected to represent a location from which a person may be expected to view the proposed Project features in the most direct manner. One viewpoint was established for the Proposed Action.

Viewpoint 1 is located at the intersection of Fifth and Baker streets and faces in a southwesterly direction (**Figure 2-1**). Viewpoint 1 is at the same elevation as the proposed Integrated Research Facility building. From this aspect, the existing landscape presents a flat valley floor with mountains rising in the background (**Figure 3-2**). The site as seen through the existing chain link fence is vegetated with scrub grasses and weeds. Dirt and gravel roadways and areas of deteriorating asphalt are also evident. Many buildings in this view are for storage and maintenance purposes. A variety of outside clutter and covered storage is visible. The buildings offer combination colors of reddish brick and gray metal. The upper portion of Building 25 blends with the dark tree-covered mountains in the background. Vertical stacks contrast sharply with the rectangular shapes of the structures.

3.6 HISTORICAL RESOURCES

The Rocky Mountain Laboratories Historic District, 24RA373 (**Figure 2-1**) was listed on the National Register of Historic Places (NRHP) in 1987. The district is eligible for the National Register for its significant architecture and historic role in scientific research (NRHP 1987). The Historic District consists of 10 structures.

Buildings 1 and 2 (**Figure 3-3)** were constructed in 1932-34 and are three-story Collegiate Gothic structures designed in a tripartite scheme, with a brick base below the first floor window sills. The buildings are of common bond, multi-colored, striated brick construction, which starts at the sill level of the first floor windows and terminates at the head of the third floor windows. Above the concrete belt course is a crenelated brick parapet with a cast concrete cap. The second and third story windows have cast concrete sills. The main entry vestibules are brick with corner quoining, terminated on the top and at each corner by a square block and ball motif cast in concrete.

Building 3 (**Figure 3-4**), constructed in 1938, is a three-story Collegiate Gothic structure. The details of Building 3 are the same as Buildings 1 and 2.

Building 4, constructed in 1936-37, was removed and replaced with Building A (**Figure 3-5**) in 1998. Building A has many of the same details as Buildings 1, 2, and 3.

Figure 3-2. Visual Quality, Existing Conditions

Figure 3-3. Overview, Building 1, facing southwest

Figure 3-4. Building 3, facing west

Figure 3-5. Building A, facing south

Figure 3-6. Buildings 5, A, and 7, facing north

Figure 3-7. Building 9, facing southeast

Buildings 5 (**Figure 3-6**) and 6, constructed in 1938 and placed into service in 1940, are both two-story Moderne style structures. These simple, rectangular masonry buildings have regularly spaced windows set singly or in pairs.

Building 7, the former heating plant, was constructed in 1938-40 and is a Moderne style structure. This three-story structure has similar details as Buildings 5 and 6 and has a tall, round masonry smoke stack on the west side.

Buildings 8 and 9 (**Figure 3-7**) are two Late Colonial Revival style residences located across 4th Street from the laboratories.

Building 8, constructed in 1936-37, is a two-story, rectangular, wood-frame structure resting on a concrete foundation with shed dormers on the second floor. The gable roof, which runs parallel to 4th Street, has a 10/12 pitch and slight eave returns. Beneath the eaves is a molded fascia that provides a lateral six-inch overhang. The lap siding has seven-inch reveal, the first floor windows are 8-over-12 wooden double hung units. The dormer windows are 8-over-8 double hung windows. The doorway is approached by four risers and is covered with an enclosed, bow-roofed portico.

Building 9, constructed in 1937, is a two-story wood frame residence set on a concrete foundation with a shed dormer on the second floor. The building is symmetrically organized with a central entry flanked by two small projecting bay windows set beneath the flared overhang of the gambrel roof. The bay windows are 8/12 on the first floor and 4/6 on each angle. The entry is marked by a gable-roofed, arched overdoor that is cut into the eave overhang and accessed by a three-riser concrete stair. Building 11 is located behind and between Buildings 8 and 9, was constructed in 1937.

The primary laboratory buildings, the power plant, and the two residences possess architectural significance in the context of the type and quality of construction. The cohesive facades, massing, and detailing of the understated Collegiate Gothic buildings creates a strong visual impression. The pair of Colonial Revival style residences located across the street from the laboratories exhibit higher than average design sophistication, craftsmanship, and use of materials. Attention to landscaping and setbacks affords a sense of continuity with the residential character of the surrounding neighborhood.

Section 106 of the National Historic Preservation Act of 1966 (as amended) requires federal agencies to consider the effects of their actions on historic properties. The procedure for meeting Section 106 requirements is defined in regulations of the Advisory Council on Historic Preservation, Protection of Historic Properties (the Code of Federal Regulations, hereafter cited as 36CFR Part 800 with subparts). The Montana State Historic Preservation Office (SHPO) provided comments on the proposed research facility. The concerns noted by SHPO centered on the potential for “an adverse effect visually, at the least” on the historic district. The SHPO comments also noted that the proposed building should be compatible with the original structures in materials, that the proposed building should be set back so as to not block a major elevation of the original structure, and that it should also be in keeping with the scale of the historic district (Dawson 2002).

3.7 AIR QUALITY

The study area for air resources consists of the area within 30 miles of the RML site. The site experiences a cool climate typical of intermountain valleys of the Rocky Mountain area.

Meteorology

Climate in the study area is influenced by major topographic features, including the Bitterroot Mountain Range to the west and the Sapphire Mountains to the east. Mountain ranges in the Bitterroot Valley trend generally north and south and affect local wind, precipitation, and temperature patterns.

Typical precipitation levels are one inch or less of precipitation per month, and temperatures range from warm to hot during the summer months. Winters are cool to cold. The average daily temperature ranges from 36° F in January to 83° F in July in Hamilton.

Wind speed and direction data for the Project area obtained from the National Oceanic and Atmospheric Administration (NOAA) show varying speeds and direction. Based on data at Corvallis and Hamilton, typical maximum wind is primarily to the southeast/south-southwest.

Due to the City of Hamilton’s physical location (e.g., proximity to mountains), meteorological conditions are conducive to atmospheric inversions. These inversions can occur throughout the year; however, they are most prevalent from October through March. When wind speed and mixing heights are low, inversions can occur, restricting emission mixing and dispersion.

The fall and winter climates in the area are cool to cold with few extended cold spells. Most precipitation during this period is in the form of snow, which accumulates in the valleys and on surrounding ridges. Precipitation during the spring usually occurs during May and June. The western portion of the valley receives more precipitation than the eastern portion, which is a function of the proximity to the Bitterroot Mountains. Summer precipitation is often associated with thunderstorms. Precipitation in the Valley area ranges from 12 to 16 inches annually along the Highway 93 corridor from Corvallis to Sula. Mean annual precipitation is about 14 inches in Hamilton, with 16 inches to 48 inches on the surrounding upland areas.

Air Quality

The State of Montana and the federal government have established ambient air quality standards for criteria air pollutants. The criteria pollutants are carbon monoxide (CO), lead (Pb), sulfur dioxide (SO_2), particulate matter smaller than 10 microns (PM_{10}), ozone, and nitrogen dioxide (NO_2). In 1997, the U.S. EPA revised the federal primary and secondary particulate matter standards by establishing annual and 24-hour standards for particles smaller than 2.5 microns diameter ($PM_{2.5}$). **Table 3-10** lists federal and state standards.

Ambient air quality standards must not be exceeded in areas where the general public has access. National primary standards are levels of air quality necessary to protect public health. National secondary standards are levels necessary to protect public welfare from known or anticipated adverse effects of a regulated air pollutant.

The attainment status for pollutants within the Project area is determined by monitoring levels of criteria pollutants for which National Ambient Air Quality Standards (NAAQS) and Montana Ambient Air Quality Standards exist. Air quality in the Hamilton and Ravalli County area is designated as attainment or unclassified for all criteria pollutants. This designation means that based on monitored and assumed air pollutant levels, there are no exceedances of air quality standards in the area.

Air emission modeling conducted at RML, which is discussed in more detail later, was performed using meteorological data from a number of sites, including data from Missoula, an area also subject

Table 3-10.
State of Montana and National Ambient Air Quality Standards

Pollutant	Averaging Time	Air Quality Standard Concentration (a)	
		Montana	National
Ozone	1 hour	195 µg/m³ (0.12 ppm)	235 µg/m³ (0.12 ppm)
	8 hours	None	157 µg/m³ (0.08 ppm)
Carbon Monoxide	1 hour	25,560 µg/m³ (23 ppm)	40,000 µg/m³ (35 ppm)
	8 hour	10,000 µg/m³ (9.0 ppm)	10,000 µg/m³ (9.0 ppm)
Nitrogen Oxides	Annual Arithmetic Mean	100 µg/m³ (0.05 ppm)	100 µg/m³ (0.05 ppm)
Sulfur Dioxide	Annual Arithmetic Mean	52 µg/m³ (0.02 ppm)	80 µg/m³ (0.03 ppm)
	24 hours	261 µg/m³ (0.10 ppm)	365 µg/m³ (0.14 ppm)
	3 hours	NA	1,300 µg/m³ (0.50 ppm) (b)
	1 hour	1,300 µg/m³ (0.50 ppm)	NA
Particulate Matter as PM_{10}	Annual Arithmetic Mean	50 µg/m³	50 µg/m³
	24 hours	150 µg/m³	150 µg/m³
Particulate Matter as $PM_{2.5}$	Annual Arithmetic Mean	15 µg/m³	15 µg/m³
	24 hours	65 µg/m³	65 µg/m³
Lead (Pb)	Quarterly Arithmetic Mean	1.5 µg/m³	1.5 µg/m³

Note: µg/m³ = micrograms per cubic meter; ppm = parts per million; PM_{10} = particulate matter smaller than 10 microns; $PM_{2.5}$ = particulate matter smaller than 2.5 microns.

Sources: Administrative Rules of Montana (ARM) 17.8 and Code of Federal Regulations, 40 CFR Part 50, National Primary and Secondary Ambient Air Quality Standards.

(a) Primary standard unless otherwise noted.

(b) Secondary standard.

to atmospheric inversions.

Modeling was completed in response to an air quality permit modification by RML to incorporate the addition of two new boilers in 1999. Results of air modeling, which included operation of the existing incinerator, predicted that emission rates from RML resulted in an ambient air quality impact of seven to 22 percent (Doucet and Mainka 1999) of the federal and Montana primary standards, designed to protect human health.

Particulate Emissions

Sources of air contaminant particulate emissions at the RML campus include incinerators, steam-generating boilers, emergency power generators, and laboratory vent hoods. Medical waste and general refuse is disposed of in the natural gas-fired incinerators. Off-gas emissions are processed through a wet scrubber to remove particulate and hydrogen chloride from combustion gases before discharge through a vertical stack to the atmosphere. The incinerators have automation systems that monitor the waste material feed rate and essential operating parameters. The boilers are fired by natural gas with diesel as a secondary fuel supply. Boiler combustion gases exit through vertical discharge stacks. Diesel-fired emergency power generator emissions primarily result from testing the units weekly. Units run for short periods to test system function. Air from the current BSL-3 laboratories is discharged through HEPA filters.

Gaseous Emissions

Gaseous emissions from RML include sulfur dioxide (SO_2), nitrogen oxides (NOx), carbon monoxide (CO), volatile organic compounds (VOCs), and particulate matter (PM) from incinerators, steam-generating boilers, emergency power generators, and laboratory vent hoods. Gaseous emissions result from waste and fuel combustion, filling and dispensing fuel from above-ground fuel tanks, and from vent hoods (operations within the laboratories).

Air Quality Monitoring Data

Ambient air quality data have been collected at monitoring stations in Hamilton and at U.S. Forest Service ranger stations at Stevensville and West Fork (**Table 3-11**). All three stations are within Ravalli County. PM_{10} data have been collected at all three sites and $PM_{2.5}$ data at one of the sites. None of the three stations reported any violations of ambient standards during the period of record.

Table 3-11. Monitoring Data – PM_{10} and $PM_{2.5}$

Site	Year	Annual Geometric Mean (µg/m³)	24-Hour High (µg/m³)	24-Hour 2nd High (µg/m³)
#0001 Ravalli County Courthouse Hamilton	1994	22.8	88	73
	1995	19.1	67	63
	1996	17.7	59	55
	1997	20.1	35	55
	1998	---	---	---
	1999	13.9	38	37
	2000	17.8	66	60
#0002 111 S. Hwy 93 Hamilton	1994	31.9	92	81
	1995	26.1	78	74
	1996	26.2	96	69
	1997	25.6	61	53
	1998	23.1	98	57
	1999	21.6	77	67
#0003 Stevensville Ranger Station	1994	23.3	60	52
	1995	20.7	61	47
	1996	21.0	56	54
	1997	23.6	54	47
	1998	22.3	96	75
	1999	18.6	47	44
	2000	16.0	33	31
#0004 W. Fork Ranger Station	1994	8.6	54	50
	1995	6.4	58	50
	1996	9.3	48	47
	1997	7.9	93	67
	1998	9.3	---	---
	1999	6.3	48	41
	2000	6.7	93	51
$PM_{2.5}$ Data				
#0001 Ravalli County Courthouse Hamilton	2000	8.01	62.7	55.7

Note: PM_{10} = particulate matter < 10 microns; $PM_{2.5}$ = particulate matter < 2.5 microns; µg/m³ = micrograms per cubic meter.

Source: USEPA 2001.

Existing Sources

Twelve known permitted or pending air emission sources occur in Ravalli County. Of them, four are fixed location sources, while the remainders are portable. The fixed location sources in Hamilton are RML, a crematorium, a biomedical manufacturing facility, and a surgical device manufacturing facility in Victor. The portable sources are gravel crushers, associated processing equipment, and asphalt plants.

Existing, permitted, industrial emission sources located within Ravalli County include: Rocky Mountain Laboratories, Bitterroot Pet Crematorium, SSP Inc., Corixa Corp., Ravalli County Road Department, Bitterroot Rock Production, Donaldson Brothers, Stewart Excavating, Gasvoda Construction, John Schlect Excavation, RBC Enterprises, and Blahnik Construction. The facilities can emit combustion products including CO, NOx, SO_2, and hydrocarbons from boilers, pathological furnaces, engines, kilns, and other processes. Other potential fugitive dust and smoke sources include farming, field and forest burning, and dust from gravel roads.

Air Quality Permit

Industrial air quality permitting is part of the Montana State Implementation Plan process. The Montana Department of Environmental Quality uses air quality permit conditions to help ensure compliance with applicable Montana and National Ambient Air Quality Standards and Prevention of Significant Deterioration increments.

Primary emitting sources at RML include the boilers for process and facility steam and the incinerators for refuse disposal. The boilers are subject to 40 CFR Part 60, Subpart Dc, Standards of Performance for Small Industrial-Commercial Steam Generating Units. The incinerators are subject to 40 CFR Part 60, Subpart Ce, Standards of Performance for Hospital/Medical/Infectious Waste Incinerators. The New Source Performance Standards for particulate matter, including visual emissions (opacity), are included in regulations for both the boiler plant and incinerators.

Potential emissions from RML were analyzed in 1999 using the EPA's Industrial Source Complex Short Term (ISCST3) air model. In the analysis (Doucet and Mainka 1999), emissions from RML were used to predict their effect on ambient air quality. Meteorological data used in the emission modeling for RML included 10 years of data from Missoula and Kalispell, Montana (Douchet and Mainka). The ISCST3 model uses source data (emissions), terrain information, and meteorological information to predict emission concentrations at distance. Results of the modeling, using meteorological data from several locations, including Missoula, Montana, a site that experiences atmospheric inversions, predicted that RML source emissions would not result in a total facility impact above Montana and federal air quality standards.

RML is currently operating under Montana Air Quality Permit to Construct No. 2991-04. Through the permit, MDEQ has set conditions that ensure provisions of ARM Title 17.8 are met (Administrative Rules for Montana, Control of Air Pollution in Montana). The current permit reflects the planned additions of another boiler, emergency power generating equipment, an above-ground fuel storage tank for the emergency generators, and laboratory fume hoods for the proposed laboratory.

Incinerator emission testing is completed annually in accordance with the Montana Source Test Protocol and Procedures Manual. Source testing for priority pollutants, (NOx, SO_2, CO_2, and PM_{10}) and other constituents (e.g., dioxins and furans), show that emissions are within MDEQ air permit limits. In addition, six operating parameters are monitored to maintain compliance with emission limits established by the air quality permit.

Source test results at RML for dioxin and furans (potential by-products resulting from incomplete combustion of plastics) show concentrations up to 0.0000000000024 grams per cubic meter of air. Based on 2003 source test results, facility dioxin/furan emissions are approximately 1/1000th of the MDEQ air permit limit of 0.0000000023 grams per cubic meter.

PSD Classification

The area surrounding the RML site is designated a Class II area, as defined by the Federal Prevention of Significant Deterioration (PSD) Air Quality program. The PSD Class II designation allows for moderate growth or degradation of air quality within certain limits above baseline air quality. Industrial emission sources proposing construction or modifications must demonstrate that proposed emissions would not exceed ambient air quality standards. Emission modeling and subsequent regulatory analysis (MDEQ 2003) demonstrate that emissions from the RML facility comply with air quality standards.

The nearest Class I area is the Selway Bitterroot Wilderness, approximately six miles west of RML.

3.8 WATER SUPPLY AND WASTEWATER

Hamilton Water Supply

The City of Hamilton's public drinking water supply is currently supplied by four municipal wells in the Hamilton area. The City of Hamilton Department of Public Works (CHDPW) owns a fifth well that is currently not operating.

The four wells currently in use have a combined maximum capacity of 2,350 gpm (CHDPW 2002). The system produced a total of 618 million gallons in 2002(CHPWD data). Of this total, the CHDPW sold 260 million gallons. The difference between the volume produced and the volume sold (60%) is attributed primarily to water lost to leaks in the system. **Figure 3-8** is a graph showing the estimated quantity of water produced in 2002 compared to the quantity lost from the system on a monthly basis.

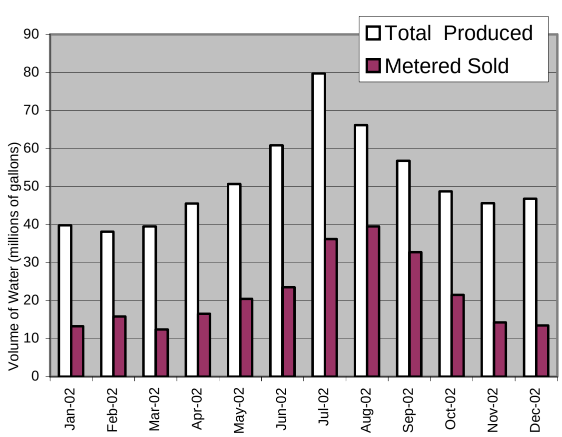


Figure 3-8.
Comparison of Volume of Water Produced to Metered Water Sold by CHDPW in 2002

CHDPW has an on-going program to identify and repair leaks. Between September 2001 and September 2002, a total of 16 leaks in the system were identified and repaired: three water main leaks, two water main gate valve leaks, three fire hydrant leaks, and five curb-stop valve leaks. Four additional leaks were identified on private service lines scheduled for repair in 2003.

The CHDPW municipal water supply system currently includes a 500,000-gallon steel storage tank and a pump station comprised of a pressure pump station using five pumps. This station provides supplemental pressure for subdivisions located on the bench southeast of Hamilton. An upcoming water improvement project includes installation of a new 1,500,000-gallon storage tank, a baffled contact basin, and an additional pressure pump station (Lowry 2003b). Long range plans include development of an additional well field to supplement water supplies and serve as a backup for the wells being installed in 2003 (Lowry 2003a).

The water system currently has an emergency backup generator capable of supplying 650 gallons per minute (gpm) that can be connected to a single well in the event of a power outage. A fixed power plant is planned by June 2004 at the new pump station. The power plant will supply three new wells capable of producing 2,500 gpm during power outages. The existing portable backup generator will still be available to produce an additional 650 gpm if needed (Lowry 2003b).

City of Hamilton policy currently allows for restricting irrigation to alternating odd and even day schedules in the event of extreme water demand.

Water used at RML is supplied by the CHDPW through a metered 10-inch water main. The average monthly water consumption at RML during 1995 and 1996 was approximately 2.277 million gallons per month (Stewart 2003). Hemisphere (2003) estimates the current average monthly water consumption at 1.7 million gallons. Five irrigation wells are located on the RML campus; water from these wells is not used for drinking or industrial purposes.

Under Hamilton Municipal Code 161, revision to Title 13 of the city water regulations, installation of new private potable water supply wells is prohibited if a residence is within 200 feet of a public water supply main. Additionally, installation of any private potable water supply well within city limits requires approval from the city council and city water department.

Groundwater

The regional direction of groundwater flow in the Bitterroot Valley is from the mountains along the basin margins toward the center of the basin and diagonally down valley (Briar and Dutton 2000). Groundwater in the Bitterroot Valley generally flows toward the Bitterroot River from the valley margins and parallel to the river in the flood plain. A groundwater investigation completed at the site in 2002 (Maxim 2003) identified that groundwater flow beneath the site is to the northwest. This is generally consistent with other studies of groundwater flow in the Bitterroot Valley (McMurtrey *et al.* 1972, Briar and Dutton 2000, Uthman 1988).

Western Groundwater Services (2000) completed a Source Water Protection Plan for the City of Hamilton in 2000. The Source Water Protection Plan for the City of Hamilton indicates that the water table in the portion of the aquifer supplying municipal wells slopes to the northwest, with a direction of flow approximately 20 to 30 degrees west of true north. The hydraulic gradient was approximated at one percent. The plan delineated the recharge zone for the municipal wells that are currently used for water supply (**Figure 3-9**). According to this analysis, the width of the aquifer contributing to the municipal wells in Hamilton is approximately 8,000 feet.

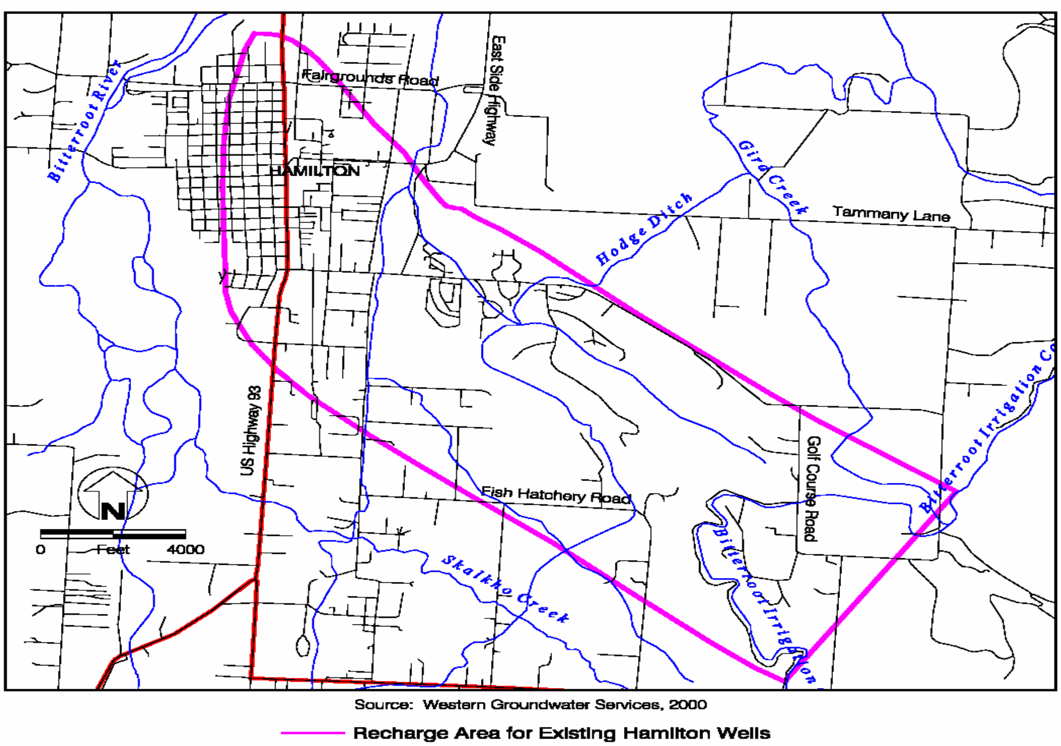
To determine the availability of groundwater, a conservative approach was used to estimate the daily flux (flow rate) of water in the shallow alluvial aquifer that is the current source of water, using Darcy's Law:

$$Q = K \times i \times ST \times W$$

Where:

Q = Flow rate
K = Hydraulic conductivity
i = Hydraulic gradient
ST = Aquifer saturated thickness
W = Aquifer Width

Figure 3-9. Hamilton Recharge Area



The following conservative input values were used for this calculation:

K = 214 feet/day

i = 0.01 (dimensionless)

ST = 49.4 feet

W = 8,000 feet

The flux or daily flow in the portion of shallow aquifer currently supplying water to municipal wells is estimated at 845,728 $feet^3$ per day. As a comparison, in 2002, CHDPW sold an average of 91,869 $feet^3$ per day, consuming about 10.9 percent of the available groundwater in 2002.

Wastewater Treatment

Currently, wastewater generated at RML is discharged to the sanitary sewer system operated by the CHDPW. Current sources of wastewater at RML include sanitary waste, liquid waste from animal facilities, boiler water, and cooling water. Wastewater discharges from RML to the CHDPW sanitary sewer via three sewer mains.

Wastewater from the following sources is treated before discharge to the sanitary sewer:

- Wastewater from cage-wash facilities in Building 13. Temperature and pH of this wastewater are measured in the holding tank before discharge to the sanitary sewer.
- Blowdown water from Building 23 incinerator scrubber. The pH and temperature of this wastewater are monitored in a settling tank before it is discharged to the sanitary sewer.
- Building 26 boiler blowdown. Temperature of this wastewater is monitored before discharge.
- Water from the cooling tower and incinerator scrubber cooling tower. Hardness and pH of this wastewater are monitored before discharge.
- Excess water from dust suppression during removal of incinerator ash. This wastewater is discharged to a settling tank before discharge to the sewer.

The CHDPW is required to conduct static replacement toxicity tests on effluent from its water treatment facility. CHDPW collects the samples and an independent laboratory conducts the tests. Marine organisms (*Ceriodaphnia sp.* or *Pimephales promelas*) are placed in samples of the treatment plant effluent and mortality is recorded over two to four days. Acute toxicity occurs when 50 percent or more mortality is observed for either species at any effluent concentration. Effluent samples from RML have not failed a test since testing began in 1996. Hemisphere (2003) estimates that RML's current wastewater effluent rate is 15,000 gallons per day.

The CHDPW wastewater treatment plant is an oxidation ditch-activated sludge facility. CHDPW upgraded the facility in 1997, adding a third clarifier and an automated sludge return and waste system resulting in the following designed operating capacities at the plant (CHDPW 2002):

- Average daily summer flow – 1.98 million gallons per day (MGD)
- Peak daily summer flow – 2.8 MGD
- Average daily winter flow – 0.5 MGD
- Peak winter flow – 1.1 MGD

As of April 2003, the wastewater treatment plant was operating within its design capacity (Lowry 2003a). Between July 2001 and July 2002, 220.81 million gallons of wastewater were treated at the plant at an average rate of 0.605 MGD (CHDPW 2002). The peak flow of 1.59 MGD occurred on July 1, 2001. From July 2001 to July 2002, the plant operated within its MDEQ discharge permit, and sampling and analysis required by the permit showed no exceedances of standards.

Solids removed from the effluent stream are collected as sludge and stored. The sludge is then composted during warm-weather months. The compost is made available for land application but is not allowed for use on vegetable gardens.

According to Dan Harmon of HDR Engineering, CHDPW's wastewater engineer (Personal communication October 7, 2003), the CHDPW produced an average of 1,000 to 1,200 lbs per day of waste solids.

The current seasonal nature of the composting operation requires that solids be stockpiled through the winter for composting in the spring. Available storage space and seasonal composting capacity are currently limiting the ability of the plant to handle more than minimal increases in annual solid load.

To accommodate increasing solids storage and handling requirements, the CHDPW is planning to construct a temporary solids storage basin to meet current requirements in the interim until a facility expansion plan is prepared (personal communication, Dan Harmon of HDR Engineering, October 3, 2003). The CHDPW plan may include implementing a year-round composting operation to upgrade solid handling capabilities (Lowry 2002).

3.9 RESOURCES NOT AFFECTED

3.9.1 Soil

3.9.1.1 Existing Condition

Native soil is mixed with fill material within the RML facility. Most soil within the RML campus is mapped as the Dominic cobbly sandy loam, which is a deep, well drained soil formed in alluvium (Bourne 1959). On-site native soil consists of 16 to 30 inches of pale brown (dry) to brown (moist) loose sand, gravel, and cobbles that is non-calcareous except for a thin carbonate coating on some cobbles. Soil in the south and east portion of the RML campus is mapped as Grantsdale loam. The Grantsdale series is a deep, well drained, moderately thick, grayish-brown surface soil underlain by moderately thick friable loam subsoil and brownish-gray, highly calcareous loam substrata. On-site fill material consists of poorly graded gravel and sand with scattered debris and pipe fragments (Huntingdon 1995).

A geotechnical investigation was completed (GMT 2002) to determine suitability of the soil at RML for construction and design standards for building footings. The Integrated Research Facility and other buildings included in the Project would be designed to meet these standards.

Several closed waste management units exist on the campus, including former seepage pits, septic tanks, and drainfields.

3.9.1.2 Rationale for No Further Discussion

Soil resources would not be affected by operations of the RML Integrated Research Facility. Construction activities would displace some soil in areas under and immediately adjacent to the proposed buildings. Weeds and grass grow in these areas. Former seepage pits, septic tanks, and filter trenches would not be impacted by construction of the Integrated Research Facility and other facility upgrades. Following construction, these areas would be reseeded and landscaped. No material generated by operation of the Integrated Research Facility would be released to soil. Therefore, soil resources would not be affected. No special measures were identified that would be required to prevent erosion during construction or operation of the facility.

3.9.2 Geology

3.9.2.1 Existing Condition

Geology

The Bitterroot Valley is a north-south trending intermontane basin about seven miles wide and 64 miles long, encompassing about 430 square miles. The Bitterroot Valley ranges from approximately 5,500 feet above sea level on its highest terraces to 3,250 feet at its termination at the Missoula Valley. It is bounded by the Bitterroot Mountains on the south and west, the Sapphire Mountains on the east, the Anaconda-Pintler Mountain range on the southeast, and the Missoula/Clark Fork Valley on the north (**Figure 1-1**). The Bitterroot Valley is characterized by two topographic features: a broad one- to two-mile wide floodplain in the center of the basin; and high, broad alluvial/colluvial terraces on the east and west flanks that are on average two to three miles wide. The terraces slope from 4° to 5° on the basin edges to less than 1° near the Bitterroot floodplain. West side terraces slope gently and merge with the floodplain and are bisected by small drainages. East side terraces have generally smooth topography, are flat topped, and relatively steep escarpments ranging 50 to 150 feet above the floodplain (Kendy and Tresch 1996).

Geologic Structure and Seismicity

The Bitterroot Valley is a structural basin formed during the emplacement of the Idaho Batholith in the late Cretaceous or early Tertiary Period resulting from basin floor dropping along pre-existing faults (McMurtrey *et al.* 1972) or as a result of eastward block displacement of crustal material along low-angle thrust faults (Hyndman *et al.* 1975). Geophysical data indicate that the western valley margin is relatively straight, but the eastern side has an irregular margin (Noble *et al.* 1982). The structural depth of the basin is one mile (Lankston 1975). Lower Tertiary age sediments within the basin have been deformed into a faulted syncline, whereas Pliocene sediments are relatively undisturbed (McMurtrey *et al.* 1972), indicating that the major tectonic events that formed the Bitterroot basin have slowed considerably since the end of the Tertiary period.

The basin is on the western edge of a broad region of basin and range tectonism. Extensional tectonism in the Bitterroot Valley, relatively dormant at present, occurs along existing fractures which are part of a regional northeast, northwest, and north-south trending fault system that exhibit long histories of recurrent activity (Barkman 1984).

At least six Class A faults or fault systems have been identified within 100 miles of the Hamilton area in western Montana (Haller *et al.* 2000). The closest Class A fault to Hamilton is the Bitterroot Fault, which runs along the east flank of the Bitterroot Mountains for a distance of approximately 60 miles and dips 45° to 90° east (Lindgren 1904, McMurtrey *et al.* 1972). The age of the faults extends from Cenozoic into late Quaternary time, with the most recent deformation occurring in pre-Bull Lake and Bull Lake glacial deposits, 300,000 to 130,000 years ago (Barkman 1984). The surface traces of the Bitterroot Fault system are shown by McMurtrey *et al.* (1972) as four traces that run along and into the Bitterroot Range from near Florence to south of Victor. Barkman (1984) identified several distinct fault scarps in the Bitterroot Valley that have been active in Quaternary time: the Bear Creek Scarp and the Curlew Fault located west of Victor, and the Tin Cup and Como scarps located north of Tin Cup Creek.

The most recent faulting appears to have occurred around 7,700 years ago on the Mission Valley section of the Mission Fault. Class A faults have evidence that at least one large-magnitude earthquake has occurred on that fault during the last two million years.

Within the last 40 years, two recordable earthquakes greater than 2.5 magnitude have occurred within 50 miles of Hamilton, Montana. In 1982, a 2.5 Richter magnitude tremor occurred approximately 20 miles southeast of Hamilton (Stickney *et al.* 2000), and on June 28, 2000, a 4.5 magnitude earthquake occurred approximately 40 miles northeast of Hamilton.

3.9.2.2 Rationale for No Further Discussion

The Bitterroot Valley has one of the lowest seismic activity ratings in western Montana (Stickney *et al.* 2000). The International Conference of Building Officials rates Hamilton as a low seismic risk area (Zone 0). By comparison, Salt Lake City is in Zone 2, and part of San Francisco is in Zone 4.

3.9.3 Floodplains

3.9.3.1 Existing Condition

The Bitterroot River watershed encompasses 2,842 square miles above its confluence with the Clark Fork River, of which 1,685 square miles are above Hamilton (Nolan 1973). The floodplain in the Hamilton area is relatively narrow and confined by older paleo-river terraces to the east and west. The proposed Integrated Research Facility and other facility upgrades would be located about 1,400 feet east of the Bitterroot River on low alluvial terrace deposits above the 100-year floodplain (**Figure 3-10**).

Executive Order 11988 requires that the Project be assessed to determine if activities would occur within a floodplain. The Project location is about 725 feet east of the 100-year floodplain at its closest approach. The elevation at the proposed Project location is about 18 feet above the 100-year floodplain base elevation (FEMA 1998).

3.9.3.2 Rationale for No Further Discussion

The proposed BSL-4 laboratory would not be located within the 100-year floodplain, and therefore requirements of EO 11988 do not apply. No additional analysis of impacts is required.

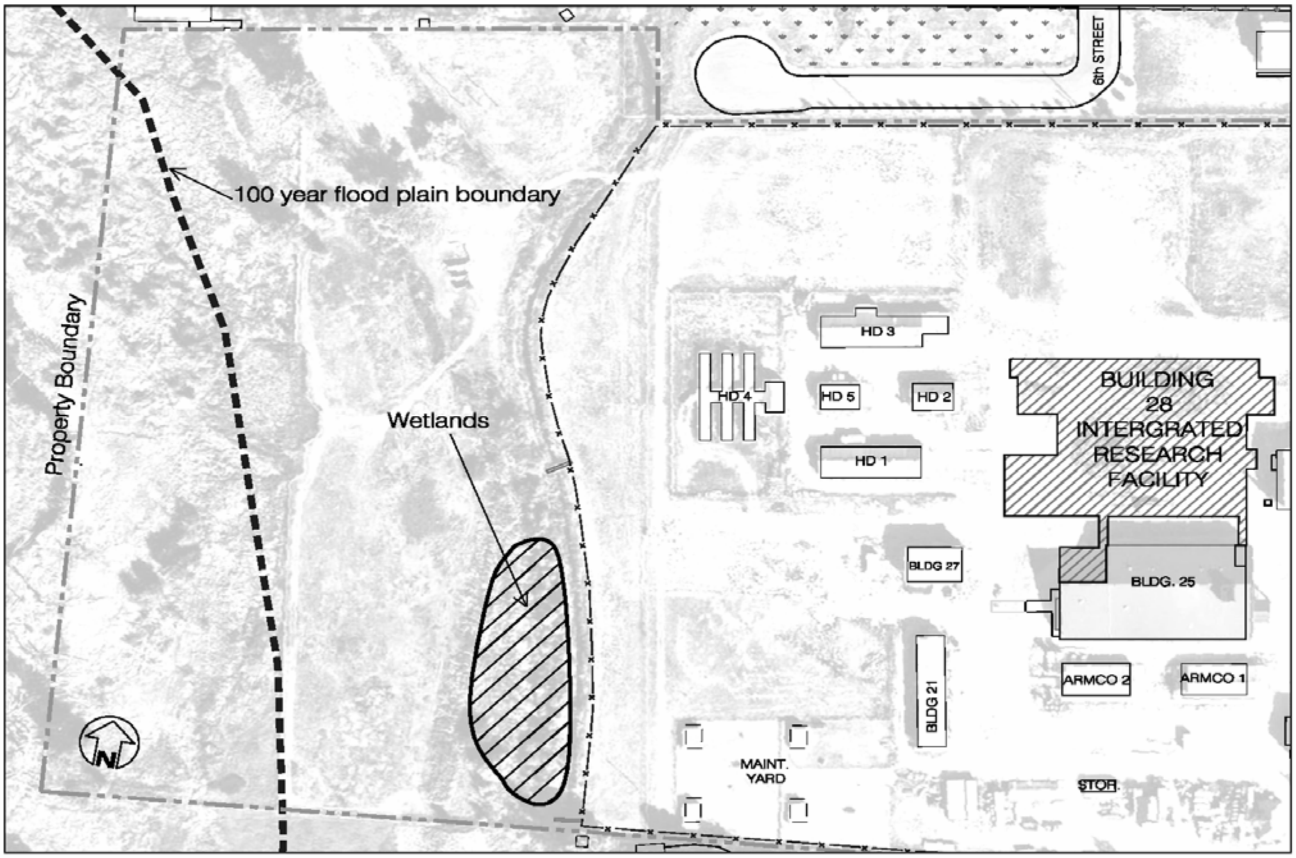


Figure 3-10. Mapped Wetlands and 100-Year Floodplain

3.9.4 Wetlands and Riparian Areas

USDHHS manual 30-40-00 (Natural Asset Review) defines wetlands as those areas inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation or aquatic life that require saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas.

Executive Order 11990, Protection of Wetlands, 42 FR 2691 (1977) as amended by Executive Order 12608, 52 F 34617 (1987), 42 U.S. Code 4321, directs each federal agency to minimize destruction, loss, or degradation of wetlands and to preserve and enhance such wetlands in carrying out their program responsibilities. Consideration must include a variety of factors such as water supply, erosion and flood prevention, maintenance of natural systems, and potential scientific benefits.

3.9.4.1 Existing Condition

The RML facility is located on a terrace above and east of the Bitterroot River floodplain. The National Wetlands Inventory map and air photos were consulted to identify riparian areas and wetlands near the RML campus. The area within the 100-year floodplain west of the RML campus is a riparian area containing wetlands. Mapped wetlands are shown in **Figure 3-10.** The closest wetland is approximately 430 feet west of the proposed Integrated Research Facility location.

3.9.4.2 Rationale for No Further Discussion

Riparian areas and wetlands would not be affected by the Proposed Action because no construction would occur in or near riparian areas or wetlands. No liquids or wastes would be discharged to wetlands during construction or operation of the Integrated Research Facility.

3.9.5 Vegetation

3.9.5.1 Existing Condition

Vegetation within the RML campus consists of lawn grasses and weeds.

3.9.5.2 Rationale for No Further Discussion

Vegetation would not be disturbed or affected outside the Integrated Research Facility construction area or by other Proposed Action activities.

3.9.6 Fish

3.9.6.1 Existing Condition

In the vicinity of Hamilton, the Bitterroot River provides habitat for approximately 12 species of coldwater fish (Holton 1990; MFWP 2002). Six salmonid species are classified as game fish in the Bitterroot River: bull trout, brook trout, brown trout, rainbow trout, westslope cutthroat trout, and mountain whitefish. Brook, brown, and rainbow trout are not native to the Bitterroot River. One fish species of concern (MNHP 2003a), the westslope cutthroat trout, is listed as common in the Bitterroot River in the vicinity of Hamilton (MFWP 2002). Bull trout, which are listed under the Endangered Species Act, are an incidental and rare resident fish species in the Bitterroot River (MFWP 2002) (see Section 3.9.8, Threatened and Endangered Species).

3.9.6.2 Rationale for No Further Discussion

Since the RML campus is located at least a quarter-mile from the Bitterroot River, and erosion control measures would be implemented at the RML campus during construction, there would be no impacts on fish species in the Bitterroot River or their habitat. Wastewater from the RML facility would enter the City of Hamilton's wastewater treatment facility. Discharges to the treatment facility from the Integrated Research Facility would not cause exceedances of permitted discharge limits for the wastewater treatment facility (see the Water Supply and Wastewater section on page 3-17). Therefore, no change in water quality of the Bitterroot River would result from operation of the Integrated Research Facility. Consequently, there would be no adverse impacts on fish species in the Bitterroot River as a result of facility construction or operation.

3.9.7 Wildlife

3.9.7.1 Existing Condition

The fauna of the valley near Hamilton is characteristic of the northern Rocky Mountains. Approximately 45 species of mammals, five species of amphibians, and nine species of reptiles may occur in the vicinity of Hamilton and RML (Foresman 2001; Maxell *et al.* 2003). Also, approximately 100 species of birds may breed in the valley near Hamilton (MTNHP 2003b). Wildlife habitat has generally been altered by agriculture and other human developments. Highly altered urban environments meet the habitat needs of fewer species, most of which tend to be generalists, and several of which are non-native (e.g., European starling, house mouse, eastern fox squirrel). Species inhabiting urban environments tend to be tolerant of disturbance.

Common species of mammals that may occur in or adjacent to Hamilton include white-tailed deer, mule deer, coyote, red fox, striped skunk, raccoon, badger, long-tailed weasel, deer mouse, house mouse, meadow vole, Columbian ground squirrel, yellow-bellied marmot, eastern fox squirrel, several species of bats (e.g., big brown bat), and shrews (e.g., masked shrew). Terrestrial garter snakes, common garter snakes, and gopher snakes may live in Hamilton. Common bird species likely to breed in the urban habitats of Hamilton include rock dove, mourning dove, great horned owl, downy woodpecker, hairy woodpecker, northern flicker, western wood-pewee, eastern kingbird, tree swallow, barn swallow, black-billed magpie, black-capped chickadee, house wren, American robin, European starling, warbling vireo, yellow warbler, western tanager, American tree sparrow, chipping sparrow, dark-eyed junco, brown-headed cowbird, house finch, American goldfinch, and house sparrow.

3.9.7.2 Rationale for No Further Discussion

The Proposed Action area provides little wildlife habitat, as vegetation consists of native and non-native grasses and weeds. Consequently, few species would find adequate breeding or foraging habitat at RML's campus. Birds nesting on buildings near the construction area may be temporarily displaced. Less mobile species of small mammals and reptiles could potentially be impacted directly. Any impacts would affect few individuals and not populations.

The Proposed Action would not affect wildlife because of the small area of disturbance and no loss of habitat.

3.9.8 Threatened and Endangered Species

3.9.8.1 Existing Condition

The U.S. Fish and Wildlife Service provided a current list (March 11, 2003) of endangered and threatened species potentially living in Ravalli County. No threatened or endangered plant species appeared on the list. The following threatened or endangered fish or animal species were listed:

- Bull Trout - Threatened
- Bald Eagle - Threatened
- Wolves - Endangered
- Lynx - Threatened
- Yellow-billed Cuckoo (western population) - Candidate

Bull Trout (Threatened)

The major population of bull trout in the Bitterroot drainage today are residential fish that tend to live in higher elevation streams. Migratory forms that live in the Bitterroot River are rare. The main stem of the Bitterroot River contains critical overwintering areas and migratory corridors. Historically, bull trout likely used the Bitterroot River and its tributaries. Currently, however, bull trout are rare in the main stem Bitterroot River from Blodgett Creek to the East Fork (Montana Bull Trout Scientific Group 1998).

Bald Eagle (Threatened)

Bald eagle nesting and roosting habitats include mature and over-mature mixed conifer, ponderosa pine, and cottonwood stands near large rivers or lakes. Bald eagles are common winter residents in the Bitterroot Valley and also pass through the area during migration. The nearest known bald eagle nest to Hamilton is located on the Teller Wildlife Refuge near Corvallis, approximately five miles from RML (Mullen 2002).

Gray Wolf (Endangered, 10(j) Population)

The Project Area is within the Central Idaho Non-essential, Experimental Population designated by U.S. Fish and Wildlife Service (1994). Wolves within this area are managed as a population proposed for listing rather than as a species listed under Section 10(j) of the Endangered Species Act (ESA). No packs are known near the area to be affected directly or indirectly by the action.

Lynx (Threatened)

Lynx often inhabit forested benches, plateaus, valleys, and gently rolling ridgetops in rugged mountain ranges (Koeler and Aubry 1994). Primary lynx habitat in the Rocky Mountains includes lodgepole pine, subalpine fir, and Englemann spruce. Lynx prefer to forage in areas that support their primary prey, the snowshoe hare. In the Bitterroot Mountains, lynx habitat has been identified at elevations of 6,200 feet and higher. Dry Douglas fir and ponderosa pine forest that occurs at lower elevation (such as around RML) is not considered lynx habitat.

Yellow-billed Cuckoo (Candidate)

The yellow-billed cuckoo is a rare transient in western Montana. It prefers areas of low, dense, shrubby vegetation in cottonwood and willow riparian corridors, open woodlands, brushy pastures, and along brushy roadsides (DeGraaf *et al.* 1991; Dobkin 1992). It selects well-concealed nest sites in shrubs or low trees, generally four to six feet above ground. Yellow-billed cuckoo have occasionally been reported (twice in 1988, once in 1997) in the Stevensville area (Montana Natural Heritage Program) but they are not known to occur near the Project area.

3.9.8.2 Rationale for No Further Discussion of Listed Species

There is no designated or proposed critical habitat present in the action area. The proposed laboratory expansion would not disturb areas beyond the existing campus area. Noise and dust created during construction on campus is not going to be loud, long-lasting or intense enough to affect individual animals. For these reasons, no effect on threatened or endangered species or their critical habitat would result from the Proposed Action. Water and air quality would be maintained, and areas outside of the construction area would not be disturbed.

3.9.9 Environmental Justice

U.S. Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations) directs federal agencies to assess whether the Proposed Action or alternatives would have disproportionately high and adverse human health or environmental impacts on minority and low-income populations. Identification of environmental issues can be accomplished through public involvement and the scoping process.

3.9.9.1 Existing Condition

The areas of potential effect for environmental justice are neighborhoods and populations adjacent to the Project area.

Five steps are used to determine environmental justice issues: (1) identify minority and low-income populations in the area affected by the Project; (2) consider relevant public health data and industry data regarding multiple and cumulative exposure of minority and low-income populations to human health or environmental hazards; (3) recognize interrelated cultural, social, occupational, historical, and economic factors that could amplify environmental effects of the Project; (4) develop effective public participation strategies that overcome linguistic, cultural, institutional, geographic, and other barriers; and (5) assure meaningful community representation.

Minority Population: For purposes of this assessment, "minority" refers to people who classified themselves in the 2000 U.S. Census as African Americans, Asian or Pacific Islanders, American Indians, Hispanics of any race or origin, or other non-White races. A "minority population" refers to an area where minority individuals comprise 25 percent or more of the population. In Ravalli County, persons of Hispanic or Latino origin account for 1.9 percent of the population, American Indian/Alaska Natives account for 1.8 percent of the population, native Hawaiian or pacific islanders account for 0.2 percent, Asians account for 0.3 percent, and Blacks account for 0.1 percent. White persons, not of Hispanic or Latino origin accounted for 96 percent of the County population in 2000 (U.S. Census Bureau 2002a).

Low-Income Populations: Low-income population refers to a community in which 25 percent or more of the population is characterized as living in poverty, as determined by statistical poverty thresholds used by the federal government. In 2000, the poverty weighted average threshold for a family of four was $17,603 and $8,794 for an unrelated individual (US Census Bureau 2001). In Ravalli County, 13.8 percent of the population is below the poverty threshold (US Census Bureau 2002b).

3.9.9.2 Rationale for No Further Discussion

The area of potential effect does not have minority or low-income populations that fulfill the first step, rendering the remaining steps irrelevant with respect to Environmental Justice.

3.9.10 Surface Water

3.9.10.1 Existing Condition

The Bitterroot River drains a basin of approximately 2,800 square miles (McMurtrey *et al.* 1972). Major tributaries entering the Bitterroot River near Hamilton include Sawtooth, Canyon, Skalkaho, and Gird creeks. The pattern of surface water flow is typical of mountain areas where spring runoff from snowmelt is often augmented by late spring or early summer rain. About 55 percent of runoff in the Bitterroot River occurs during May and June (McMurtrey *et al.* 1972). Permeable soil and extensive farming generally prevent surface runoff, except during storms of high intensity or during snowmelt while the ground is frozen. Portions of both tributaries flowing from the east to the Bitterroot River and the Bitterroot River itself in the vicinity of RML are diverted to canals and ditches during irrigation months of May through September (Western Groundwater Services 2000).

The only surface water body within ½-mile of the site is the Bitterroot River. The Bitterroot River is classified as a B-1 stream, suitable for drinking, culinary and food processing purposes after treatment, as well as swimming, bathing, recreation, and the growth and propagation of salmonids (MDEQ 2000). The MDEQ reported in the total maximum daily loads (TMDL) screening for the Bitterroot River and associated tributaries that the most probable sources of impairment for the river are pasture and range grazing in riparian areas, bank destabilization, agricultural and urban runoff, storm sewers, and general habitat modifications. The Bitterroot River from Skalkaho Creek to Eightmile Creek fully supports agricultural and industrial uses and it partially supports swimming and recreational activities, fisheries, and aquatic organisms (MDEQ 2000). The Bitterroot River is on the 303(d) list of impaired streams and has been given a high priority for development of TMDLs. Non-point source TMDLs have not been approved by MDEQ on the Bitterroot River, but an anti-degradation point source TMDL has been approved for lead, copper, and zinc.

3.9.10.2 Rationale for No Further Discussion

Construction of the Integrated Research Facility would not affect surface water resources. Surface water would not be used at the Integrated Research Facility, and wastewater discharged to the Hamilton wastewater treatment plant would not result in exceedances of permitted discharge from the plant. Because wastewater treatment standards would be met, there would be no impact on surface water.

3.9.11 Groundwater Quality

3.9.11.1 Existing Condition

Briar and Dutton (2002) sampled 239 wells in the Hamilton aquifer for nitrate and 43 wells for common ions, trace elements, and radon. The median nitrate concentration for samples from wells on the west side of the Bitterroot River was 0.17 milligrams per liter (mg/L), while the median for samples from wells on the east side was 1.05 mg/L (Briar and Dutton 2000). All samples had nitrate concentrations below the MDEQ WQB-7 human health standard of 10 mg/L. Most groundwater in the Hamilton area is a calcium bicarbonate type (Briar and Dutton 2000). One sample contained a cadmium concentration of 5 micrograms per liter (µg/L), equal to the MDEQ circular WQB-7 human health standard. No other concentrations exceeded human health-based groundwater quality standards. Concentrations of fluoride, iron, and manganese measured in groundwater samples from some wells exceeded circular WQB-7 drinking water standards for taste, odor, and color. Radon measured in 43 samples ranged from 150 to 3,700 picocuries per liter (pCi/L), with a median concentration of 765 pCi/L for 18 of the 43 samples collected in the Hamilton area. The five Hamilton municipal wells were sampled in 2001 and exhibited an average radon gas concentration of 1,350 pCi/L (Maxim 2003). There is currently no drinking water standard for radon. The EPA has proposed a maximum contaminant level (MCL) of 300 pCi/L and an alternative MCL of 1,200 pCi/L. The alternative MCL can only be used if an approved mixed-media mitigation program is adopted to educate water users with respect to radon exposure. The proposed standards are anticipated to become final in 2006-2007.

Between 1992 and 2003, several groundwater investigations were completed using site monitoring wells. The investigations included groundwater sampling and analysis (Envirocon 1993; Maxim 1998, 2001a, 2001b, 2003). Samples collected from RML monitoring wells have not exhibited concentrations of any parameters (volatile organic compounds, semivolatile organic compounds, dissolved metals, and radioactivity) exceeding Montana or federal water quality standards (e.g., USEPA MCLs or MDEQ Circular WQB-7 standards), with two exceptions: gross alpha radiation and dissolved lead.

Samples from facility monitoring wells have exceeded the U.S. EPA MCL and/or MDEQ Circular WQB-7 standards for gross alpha emissions on at least one occasion. There is no evidence from any groundwater investigation at RML that suggests radon, gross alpha, or gross beta are originating at RML. Alpha-emitting radionuclides have never been used during biological research at RML or stored at the facility. Alpha particles are produced during the radioactive decay of radium-226 into radon gas. In 2003, upgradient and downgradient monitoring wells at RML were sampled using low-flow techniques and analyzed for gross beta, radon gas, and gross alpha concentrations. Gross beta concentrations were similar in all wells and below the California

Department of Health Services standard of 50 pCi/L. Radon levels were compared to California's standards because Montana and USEPA do not have concentration-based standards for gross beta. Radon gas was present at levels above USEPA's proposed standard of 300 pCi/L (Maxim 2003). Gross alpha levels in all four wells were near or above MDEQ's 1.5 pCi/L standard, but all samples exhibited gross alpha levels below USEPA's MCL (15 pCi/L). Based on these data, data from Briar and Dutton (2000), and 2001 Hamilton municipal well data, the presence of radon, gross alpha radiation, and gross beta radiation in groundwater is associated with the naturally occurring decay of radioactive elements (e.g., uranium and daughter products) in the aquifer matrix.

The second water quality standard exceedance was from a June 1997 sample obtained from monitoring well 92-1 that exhibited total lead above the MDEQ circular WQB-7 standard. To confirm this finding, a sampling and analysis plan to re-sample site wells for total and dissolved lead during low and high groundwater elevations in 2001 was implemented. Results of 2001 groundwater monitoring confirmed that lead was not present above WQB-7 standards and indicated that the lead exceedance in the 1997 sample was most likely associated with naturally occurring suspended sediments entrained in the water sample (Maxim 2003).

3.9.11.2 Rationale for No Further Discussion

Implementing the Proposed Action would not result in release of potential contaminants to groundwater. Hazardous, radioactive, and solid waste would be handled in accordance with applicable laws and regulations. The only additional release of water to the subsurface would be in the five dry wells installed to allow storm water to infiltrate to the subsurface. Typically, minor concentrations of impurities (e.g., grease and oil, road salts) may be entrained by storm water from parking lots. These impurities would be filtered in the drywells. The Integrated Research Facility is not anticipated to have an impact on the quality of groundwater.

CHAPTER 4
ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

This chapter describes the potential direct, indirect, and cumulative effects of the Proposed Action (Chapter 2) and No Action alternatives. Potential direct and indirect impacts could result from the Project. Cumulative effects are those impacts that could result from combining the impacts of the Proposed Action with past, present, and reasonably foreseeable future actions.

This chapter also describes unavoidable adverse effects (those effects that remain after implementation of mitigation measures) and the relationship between short-term uses of resources and long-term productivity.

Irreversible or irretrievable commitments of resources that could result are also described. Irreversible commitments are those that cannot be reversed except over a very long period of time. Irretrievable commitments are those that are lost for a shorter period.

Reasonably Foreseeable Actions

Several actions are currently under way or will be conducted at the RML campus over the next few years. These activities are independent of the Proposed Action; however, implementation of these actions will affect the Project site. These actions, shown in **Figure 4-1**, are as follows:

- With the exception of the outer six-foot chain link fence on the south side of the RML property, all other existing fence will be replaced with black steel fence surrounding the entire site. This is in compliance with new NIH security guidelines;
- The entrance at 4th and Grove will be moved north to be offset from Grove Street. Staff will enter here and pass through an entrance manned with security guards or NIH police officers 24 hours a day, 7 days a week. A landscaped security barrier (natural materials such as boulders, earth, and vegetation) will be incorporated at 4th and Grove;
- A planned central shipping and receiving building (undetermined size) at the northeast corner of the campus near the north gate will be built for receiving and shipping goods. It will be equipped with an X-ray machine and other security screening devices. Once construction is complete, material delivery will be through the north gate. All commercial delivery vehicles will undergo a vehicle inspection before entering the RML facility. A loading dock will be present at this site, and deliveries will be off-loaded here and transported around campus by RML staff. Commercial delivery trucks would not be allowed to drive around on campus with the possible exception of animal deliveries;
- The fence on the north side of campus will be replaced with the black steel fencing under Phase 2 of the Fence Upgrade Project;
- A visitor's center will be constructed north of the existing guard station and gate to provide information, security screening of visitors, and a meeting area for visitors and RML staff. All visitors conducting business on the RML campus will have their person and personal belongings screened at the visitor center before accessing the RML campus. A special parking area will be provided for visitors where vehicles will be screened;
- A new employee parking lot will be constructed on the north side of the site;
- A new storage building may be constructed in the southwest corner of the campus;
- A silencer has been installed on the incinerator to reduce noise. A project to further reduce the noise on the incinerator cooling tower and the Building 27 load bank is currently under design;
- Roads (shown on Figure 4-1) will be paved; and
- Trees, grass, and other vegetation will be planted inside the paved road on the perimeter of the campus.

4.2 SOCIAL RESOURCES

4.2.1 Direct and Indirect Effects

4.2.1.1 Proposed Action

Population and Demographic Trends

Additional employment from the proposed Integrated Research Facility includes up to 200 workers at the peak of the construction phase, and up to 100 employees phased in over several years following the opening of the facility. If the Proposed Action were to be selected, the number of new residents who would move to Ravalli County and the City of Hamilton would represent a small portion of the anticipated population increase that is expected to occur regardless of the inducement of the Proposed Action. If all new employees were new residents of the county, chose to live in Ravalli County, and had household sizes that matched the Ravalli County rate of 2.48 persons per household, the Proposed Action would add about 248 new residents. These residents would be added to both the low and high projection of 8,000 and 18,000 new people expected as the result of net in-migration by 2010. The population increase from construction of the Integrated Research Facility (248 people) represents 1.4 to 3 percent of the total projected increase in county residents.

The age structure of the county's population has changed during the period of rapid growth (1990-2000), and Integrated Research Facility-related newcomers are expected to more closely match the new population than the historic population. No impact is expected on the ethnic or gender make-up of the population. Most jobs created by the Proposed Action would require skilled and experienced, mature workers. Average education levels in Ravalli County and Hamilton may increase slightly as a result of the additional staff at RML.

Housing

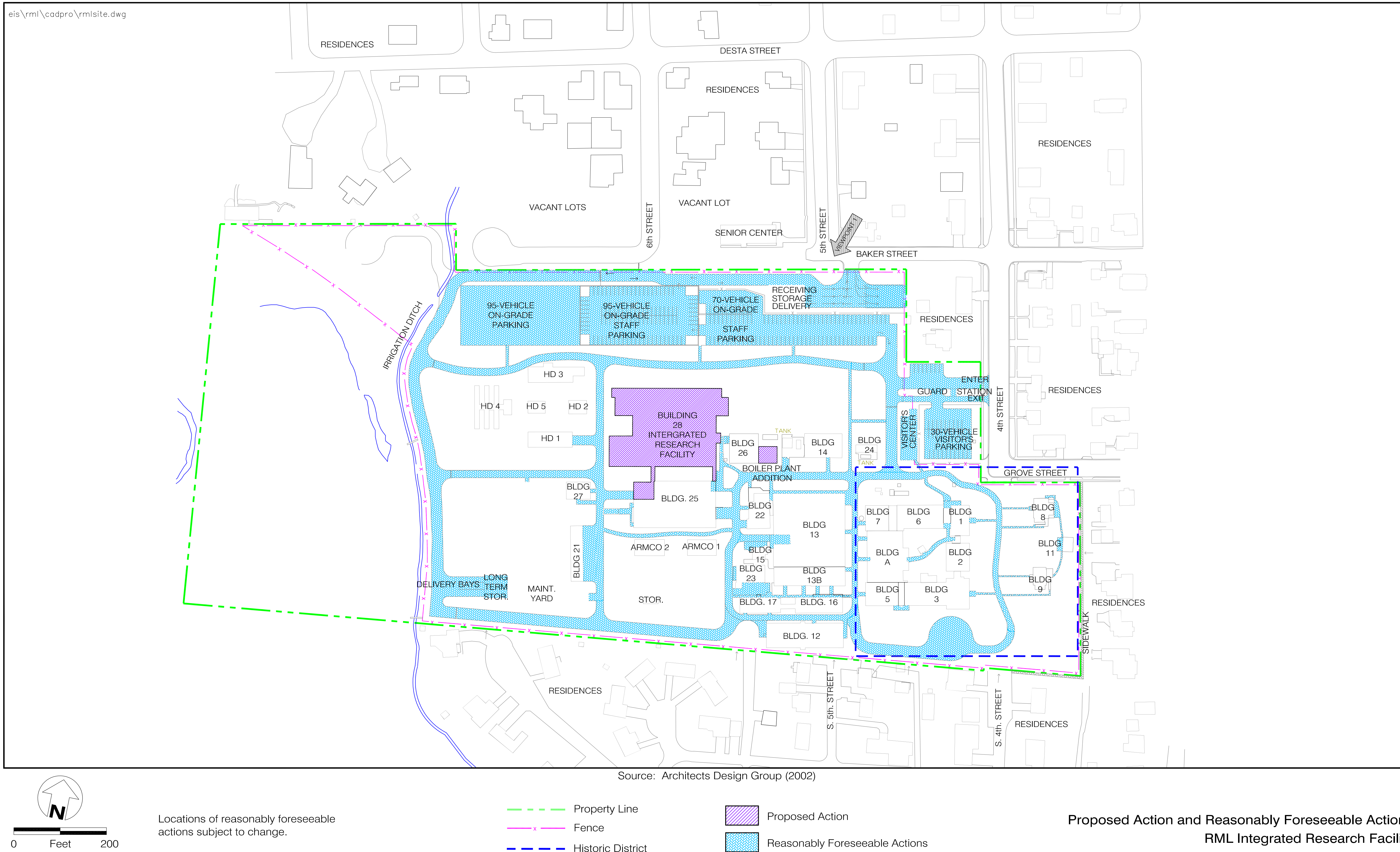
The neighborhood adjacent to RML may encounter direct negative impacts during construction of the Integrated Research Facility if the Proposed Action were selected. Construction is estimated to take two years, during which time trucks would access the property and equipment would be operating.

To evaluate potential impacts to property values, an evaluation of value trends for residential property adjacent to BSL-4 laboratories in other locations was completed. The information suggests that construction and operation of BSL-4 laboratories in residential areas does not result in lowering of property value. The value of residential property adjacent to the Centers for Disease Control (CDC) BSL-4 laboratory in Atlanta, Georgia, has increased over its operational history (Rollins 2003). The surrounding up-scale residential area has townhouses valued between $300,000 and $500,000, and homes selling for over $700,000. Bowers (2003) also reported that property values in the area surrounding a BSL-4 facility in Galveston, Texas have not declined. In Winnipeg, Manitoba, property values have remained consistent with the surrounding mixed-use area despite the development of a BSL-4 laboratory (Halladay 2003).

Property values in the proposed Integrated Research Facility area and prices of property adjacent to RML in Hamilton are stable. Houses do not remain on the market longer than normal since the Proposed Action was discussed at the June DEIS public meeting (Dowling 2003, Polumsky 2003, Rose 2003). Housing prices in the neighborhood are $20,000 to $30,000 higher than in other sections of Hamilton (Dowling 2003).

Based on population projections and numbers of people per household unique to Hamilton, between 335 and 900 new housing units would be needed by 2010 to accommodate projected new growth in the community. While it is unknown whether all new RML employees would move to Hamilton, the number of projected new homes is sufficient to house them.

Housing construction is a thriving industry in Ravalli County. The number of new homes required by Integrated Research Facility-related growth would support that industry. Housing prices in the county continue to increase faster than wages. Addition of new homes would result in an increase in business for homebuilders and real estate developers. The increase in population as a result of the Proposed Action would not require special mitigation actions beyond those listed in the Ravalli County Growth Policy (2002) and the City of Hamilton Comprehensive Master Plan (1998).



Source: Architects Design Group (2002)

Locations of reasonably foreseeable actions subject to change.

Property Line
Fence
Historic District
Proposed Action
Reasonably Foreseeable Actions

Proposed Action and Reasonably Foreseeable Actions
RML Integrated Research Facility
Hamilton, Montana
FIGURE 4-1

Education

School capacity is adequate for growth, including projections for the Integrated Research Facility, especially since school-aged population levels are decreasing.

Community Safety and Risk

The increased physical and procedural safety measures inherent in the BSL-4 laboratories and the Integrated Research Facility increase security. Increased security would actually reduce threats from terrorism and possible release of a studied agent into the community. The BSL-4 laboratory is designed to be self-contained, and there is complete redundancy in the electrical and mechanical systems. In more than 30 years of working with BSL-4 agents in the U.S., there has never been a confirmed release to a community from a laboratory (see **Appendix D**). Few incidences of infections of laboratory workers have occurred. However, backup mechanical and procedural safety systems for these laboratories identified the incidents, and actions were taken to protect the worker and the public from infection.

The mission of NIH the nature of how agents would be studied at RML, and the inability of many agents to directly transmit from human to human without an intermediate host or deliberate act (e.g. bite, intimate contact), also reduces the risk to the community. NIH, and its associated laboratories, including RML, do not and would not work with weapons-grade material. NIH is the steward of medical and behavioral research for the nation, whose mission is "science in pursuit of fundamental knowledge about the nature and behavior of living systems and the application of that knowledge to extend healthy life and reduce the burdens of illness and disability" (USDHHS 2001). In realizing this mission, NIH provides leadership and direction to programs designed to improve the health of people by conducting and supporting research in the causes, diagnosis, prevention, and cure of human diseases. This research requires a small quantity of nonweapons-grade materials, while reducing the threat of spread to the community and the chance of becoming a target for terrorism.

It is not known specifically what agents would be studied at the Integrated Research Facility. It is known that smallpox would not be studied. In the U.S., CDC in Atlanta is the only place where smallpox research is allowed. Because NIH's mission is to reduce illness from emerging and re-emerging diseases, NIH and RML operate in a reactionary mode, shifting research emphasis to those diseases.

All NIH laboratory facilities are designed and constructed to a BSL-2. The exact containment requirements of agents vary by protocol and are determined through risk assessment by the Institutional Biosafety Committee (IBC), the biological safety officer (BSO), and other relevant entities. New, emerging, or re-emerging pathogens would be handled conservatively, because often the scientific information necessary to conduct a reliable risk assessment has not yet been developed or discovered. Hantavirus with pulmonary syndrome (new world hantaan virus), HIV, and SARS are examples of organisms that have been safely handled by NIAID personnel in laboratories using conservative containment approaches until pertinent scientific data could be collected. Further, NIH maintains Certified Biological Safety professionals on staff to ensure that appropriate practices, procedures, equipment, and containment facilities would be used.

All diseases that would be studied at the Integrated Research Facility are naturally occurring. Spread of diseases may occur as they overcome natural mechanisms that keep them in check or through manipulation by man to make them more virulent. For many diseases, transmission from person to person is not possible without an intermediate host or a deliberate act. For example, person-to-person transmission of Ebola hemorrhagic fever and Marburg fever from person-to-person occurs through direct contact with infected blood, secretions, organs, and semen (see **Appendix B**). Hemorrhagic fevers commonly require the bite of an infected host (e.g., tick) for transmission to occur. Therefore, the nature of transmission of many diseases that would be studied at RML provides a natural mechanism restricting their spread in the community.

Numerous methods would be employed to control access to agents and for the facility to reduce the potential for release of an agent to the environment or community. These include:

- Specialized laboratory construction;
- Employee screening and training;

- Site security;
- Air and wastewater treatment;
- Backup systems; and
- Emergency response.

As described in Chapter 2 and **Appendix E**, BSL-4 laboratories are constructed and operated to reduce or eliminate potential for worker exposure and release of an agent. The laboratory design and decontamination protocols for workers and materials brought in and out of the laboratories (See **Appendices D and E**) provides advanced laboratory safety. All scientists working in the Integrated Research Facility must demonstrate superior training and working knowledge of laboratory procedures aimed at preventing infection and release of agents. Regular training would be completed to ensure that workers remain true to the policies and protocols.

Details on how waste streams (air and water) would be handled to prevent release of an agent can be found in General Building Design Components in Chapter 2. These state-of-the-art systems, proven through use at existing BSL-4 laboratories, would prevent possible release of agents from the Integrated Research Facility. System maintenance and monitoring would be completed to ensure proper operation. Biological safety procedures would be based on the concept of containment and would follow the maximum standards of facility design available (CDC 1999). The facility design for maximum-containment BSL-4laboratories has been established and tested at the CDC facilities in Atlanta, Georgia, and the United States Army Medical Research Institute of Infectious Diseases at Ft. Detrick, Maryland (CDC 1999, Wedum 1996, Crane *et al.* 1999).

Use of primary and secondary laboratory barriers (e.g., personal protective equipment, biological safety cabinets, airlocks, etc.) would be carefully designed and implemented in the NIH exposure control plan. This plan would be followed at the proposed facility. The plan describes integration of biological risk assessment, safety equipment, training, and occupational health services into coordinated standard operating procedures (see **Appendix E**) for prevention, detection, and mitigation of potential laboratory acquired infections.

Engineering controls designed into the BSL-4 facility, particularly the air-handling systems and HEPA filtration placement, would prevent escape of potentially infectious materials from the laboratory. Several backup systems aimed at preventing a release would be put into place, including automatic lock-down when power is lost, backup power generation on campus, and backup wastewater and air systems should one be offline for maintenance and disinfection. These systems would be incorporated into the design to ensure releases would not occur. Backup power on the community water system is also planned by the City of Hamilton (see Water Supply in Chapter 3).

Security measures aimed at protecting workers and the community are provided in Chapter 2. Access to the Integrated Research Facility requires the highest clearance from the Laboratory/Branch Chief in accordance with NIH and RML security protocols for access to the BSL-4 laboratory. No one would be allowed to enter the BSL-4 laboratory alone. No opportunity would exist for unauthorized or undocumented access to the BSL-4 facility.

The combination of pre-planning, engineering controls, and limitation of access to the Integrated Research Facility would reduce the risk of laboratory-acquired infections.

Agent Communicability and Treatment

Understanding communicability of infectious diseases has evolved over the last 10 years. In the past, a person exposed to BSL-4 type agents was immediately placed in isolation for 21 days (Risi 2003). Infectious disease specialists now know that it takes at least 48 hours for an exposed person to become contagious, regardless of microbe type. This provides adequate time to transport and initiate treatment to benefit the individual and isolate a potentially exposed person from the greater population.

Protocols exist for treatment of personnel injured or potentially exposed at RML. Through collaboration with local emergency response agencies, the steps to follow in the event of a potential exposure at RML would include:

- Remove the patient to a safe area outside the laboratory and prepare for transport and complete initial triage;

- Transport the patient to a local hospital if there is a life-threatening injury (in addition to potential exposure) or stabilize for transport to a regional hospital;
- Assess the patient's condition and risk to the community;
- Place the patient in isolation, if warranted; and
- Initiate treatment.

Emergency Response

Local emergency response agencies indicate they have the ability to respond quickly and adequately to any emergency that may arise at RML. The Hamilton Volunteer Fire Department is confident in their ability to respond to an emergency at RML (Wilson 2003a). The Fire Department is working with RML to ensure that it has the equipment needed to respond to any fire incident at the RML campus. Neither the Hamilton Police Department nor the Ravalli County Sheriff's Department expects the proposed construction and operation of the Integrated Research Facility to create the need for more officers and equipment (Auch 2003; Hoffman 2003). The Bitterroot Valley EMS, the local ambulance service, does not anticipate that the proposed Integrated Research Facility would present any specific problems to the EMTs, nor does the organization foresee the need for additional employees or equipment (Neff 2003). The proposed Integrated Research Facility would not create a need for additional staff at Marcus Daly Hospital, but capital improvements may be needed should a potentially infected person with a life-threatening injury be transported to Marcus Daly for stabilization prior to transport to a regional hospital such as St. Patrick Hospital in Missoula (Bartos 2003). St. Patrick Hospital meets all required standards for handling infectious disease cases (Risi 2003).

Most emergency response agencies indicated that additional training on the communicability of agents and anticipated emergency response protocols would be useful. NIH and RML, in collaboration with local emergency response agencies, have committed to provide this training.

Reasonably foreseeable actions are provided in Cumulative Effects, Section 4.2.2.

Risk Assessments

Theoretically, human error or multiple, simultaneous mechanical failures could lead to accidental release of biological materials. However, redundancy of safety equipment and procedures, operational safeguards, monitoring systems, and the overall safety record of biomedical and microbiological laboratories indicate that this is not a significant risk. Nevertheless, in order to address community safety concerns, the NIH applied both qualitative and quantitative risk assessment strategies to investigate potential community impacts of the proposed Integrated Research Facility at the RML. The qualitative assessment included a literature review regarding laboratory acquired infections; a review of all infectious disease research protocols performed by the NIAID requiring BSL-2 with BSL-3 practices; BSL-3; or BSL-4 facilities for the past two decades; review of all NIAID accidents associated with these laboratories; injuries and illnesses during the same period of time (see **Appendix D**); and review of RML medical waste incinerator operations, infectious waste handling procedures, animal containment, and procedures for biological material shipment. Additionally, a survey was conducted to determine the safety records of BSL-4 laboratories worldwide with 20 or more years of operating experience.

Laboratory-Acquired Infections. Literature review reveals that laboratory-acquired infections have occurred since bacteria were first isolated. Within four years of the isolation of diphtheria, Riesman reported the first documented laboratory-acquired infection in 1898. Since that time, laboratory-acquired infections have been tracked in the scientific literature. The most recently published review indicates approximately 5,346 occupationally acquired infections have occurred in individuals working with microorganisms since 1898 (Harding and Byers 1999). Since the publication by Harding *et al.*, six more infections acquired occupationally have been reported by the Centers for Disease Control and Prevention in the Morbidity and Mortality Weekly Report (MMWR) involving *Neisseria meningitis* (bacterial meningitis) in two laboratory workers in clinical settings; a microbiologist in a research laboratory who contracted *Burkholderia mallei* (glanders); two cases of West Nile virus contracted through either a puncture or laceration in public health laboratory situations; and one case of cutaneous anthrax in an worker in an environmental microbiology laboratory. This is a remarkably small number of occupationally acquired infections reported world-wide over a 100-year period given the vast amount of microbiological activity that has occurred in both clinical and research settings during that time. Further, no reports have been found of laboratory-attributable infection in persons who were never in a laboratory building or who were not in some way associated with the laboratory (Wedum 1996).

The NIAID has recently conducted a retrospective study of all reported injuries and illnesses in the last 20 years (1982-2003) within the Institute occurring in BSL-3 laboratories or BSL-2 laboratories utilizing BSL-3 practices and procedures (Johnson 2003, see **Appendix D**). Employees at risk of exposure worked approximately 3,189, 700 hours with a variety of microbial organisms resulting in one clinical infection and four so-called "silent infections" (meaning without symptoms) documented through antibody production or skin test conversion. There is no evidence that any microorganism was released from these laboratories; nor were there any infections in adjacent civilian communities. This record stretches to 70 years at the Rocky Mountain Laboratories (Johnson 2003, see **Appendix D**).

With regard to other BSL-4 (formerly designated P4) laboratories worldwide, the safety record is remarkable. In a 10-year period from 1959-1969, only one laboratory-acquired infection occurred in a worker in each of the two existing P4 facilities at Ft. Detrick, Maryland (Wedum 1996). Both infections were cutaneous in nature, did not require hospitalization, and posed no risk to the community. NIAID has performed a survey of BSL-4 laboratories worldwide with over 20 years of operating history to determine the number and severity of laboratory-acquired infections occurring within these facilities (Johnson 2003, see **Appendix D**). In the past 31.5 years (approximately 344,000 man-hours of work), in newer BSL-4 suit facilities at the U.S. Army Research Institute for Infectious Diseases (USAMRIID) at Ft. Detrick, Maryland, there have been no clinical or sub-clinical infections from any BSL-4 agent. There have been no environmental releases of infectious agents from these laboratories. The Centers for Disease Control and Prevention has operated P4/BSL-4 facilities for over 30 years (120,560 man-hours of work in BSL-4 laboratories). There have been no clinical or sub-clinical infections and no releases of infectious agents to the environment. The National Institute for Communicable Diseases in Johannesburg, South Africa, has operated BSL-4 laboratories for over 22 years (approximately 40,000 man-hours), where much of the work was devoted to searching for wild reservoirs of Marburg and Ebola viruses. No infections or environmental releases of infectious agents have been recorded. In summary, over 604,000 man-hours of work with exotic agents in BSL-4 laboratories have taken place without any evidence of laboratory-acquired infection or environmental release.

Based on the NIAID safety record over the past two decades; the safety record in general of P4/BSL-4 laboratories; the lack of occupationally acquired infections in employees working in these facilities during the past 30 years; and the fact that there have been no environmental releases of infectious agents from these facilities, the conclusion can be made that the risk to communities surrounding BSL-4 laboratories is negligible.

Inactivation of materials infected with agents of transmissible spongiform encephalopathies (prion diseases). High temperature incineration continues to be the disposal method of choice for medical and veterinary wastes as it has been demonstrated to be effective at inactivating all types of pathogens. Currently the only approved method for disposing of prion-contaminated animals and animal waste/bedding is incineration (WHO 1999). Due to the amount of prion research conducted at RML, an on-site incinerator is required. Modern incinerators with efficient effluent scrubbing systems, such as the RML incinerator, provide an environmentally and economically superior method for disposal of medical/pathological waste compared to transporting via diesel-powered vehicles to a landfill. Additionally, the on-site incinerator provides a critical redundant method for disinfection and disposal of medical/pathological waste generated by research conducted at RML.

Safe disposal of potentially infectious wastes is an issue of concern to all biomedical laboratories. Of particular concern are wastes potentially contaminated with the agents that cause a group of diseases referred to as transmissible spongiform encephalopathies (TSE), commonly referred to as prion diseases. These agents are resistant to most conventional methods of inactivation, including heat processing (Taylor 1998).

The incinerator at RML is a Consumat 325 Incinerator. Both state and federal authorities license it as a hospital medical infectious waste incinerator. To be certified as such, the two-stage incineration process must allow for a minimum of four hours of burn time at approximately 1800°F (983°C). This burn time is much longer than allowed in the following referenced experiments. The operational plans for this incinerator also include a variety of standard maintenance and operational testing to ensure that each run maintains that minimum temperature. (There is another incinerator at RML (Consumat 225), but this unit will not be used to incinerate infectious materials.)

Experiments conducted by the NIH indicate that high-temperature incineration can completely destroy agents of TSE. When experimental inactivation of tissues containing high concentrations of a particularly heat resistant strain of TSE (hamster adapted scrapie strain 263K) was performed under incineration-like conditions at approximately 1000°C for 15 minutes, no detectable infectivity remained in the ash (Brown *et al.* 2000, Brown *et al.* 2003). Similar experiments performed at 600°C for 15 minutes demonstrated a very low level of residual infectivity in the ash.

No information or data has been published to suggest that TSE agent infectivity may form as recombination products from cooling of non-infectious emissions. The presence of an inorganic template of agent replication from infectious material has been hypothesized to explain the extreme resistance of TSE agents in ash to thermal inactivation. This hypothesis assumed potential formation directly from infectious material, not that it formed from non-infectious incineration products (Brown 2000).

In order to evaluate this hypothesis, a series of experiments simulating combustion conditions in medical waste incinerators, including a starved-air, two-stage design similar to the Consumat 325, have recently been completed (Brown *et al.* 2003). Bioassays of cooled air emissions from combustion of tissues infected with high concentrations of scrapie strain 263K at 600°C and 1000°C revealed no evidence of infectivity, confirming that emissions to the stack do not contain detectable infectious agents released from the combustion chamber or formed as recombinants on cooling.

Decontamination of exhaust air. Air exhausted from biological safety cabinets (a piece of laboratory containment equipment in which infectious materials must be manipulated at BSL-3 and above) is passed through a high-efficiency particulate air (HEPA) filter prior to recirculation to a laboratory room or discharge through the building exhaust system. These are disposable, extended/pleated medium, dry-type filters with (1) rigid casing enclosing the full depth of the pleats; (2) minimum particulate removal of 99.97% for thermally generated monodisperse dioctylphthalate (DOP) smoke particles or equivalent with a diameter of 0.3 μm; (3) maximum pressure drop of 250 Pa (1.0 in wg) when clean and operated at rated airflow capacity; and (4) no area showing a penetration exceeding 0.01% when scan-tested with polydisperse aerosol having a light scattering median size of 0.7 μm and a geometric standard deviation of 2.4 (National Sanitation Foundation (NSF) 2002). These filters are also used to treat exhaust air prior to discharge to the outdoors. In a BSL-4 laboratory, two HEPA filters are used in series to assure the exhaust air is sufficiently treated before discharge to the outdoors. In effect, all discharge air is filtered at least twice, and in many cases three times, prior to discharge. HEPA filter installations, whether in containment equipment such as biological safety cabinets or in building mechanical systems, are tested in place at least once per year using NSF Standard 49 procedures (NSF 2002) that provide quantitative assurance that the installations do not contain defects that reduce microbiological safety. HEPA filters are known to have long functional lives; however, age does play a factor in decreasing tensile strength of the filter media (First 1996; Edwards 2002). For this reason, the RML Integrated Research Facility would use a conservative terminal date of five years of service for HEPA filters in biological safety cabinets and other applications (First MW, 1996). The likelihood of infectious microorganisms being exhausted from the Integrated Research Facility in numbers sufficient to cause harm to the public or the environment is negligible.

Escape of an Infected Animal. The likelihood of escape of an infected animal from a containment animal facility is extremely remote. Due to the specialized design and construction of BSL-3 and BSL-4 laboratories, modes of escape are minimized to the maximum extent. Containment husbandry practices further reduce the already miniscule risk. Simultaneous breakdown of multiple levels of physical and procedural controls would need to occur for a live animal to escape from the containment laboratories. Daily observations of animals are performed to further reduce the possibility that a missing animal would go unnoticed.

A BSL-4 animal room is an airtight room with positive pressure gasket doors providing an absolute seal when the doors are closed. Access to these areas is through airlocks with interlocking positive pressure doors and a chemical shower, thus adding even more physical barriers. In the event that a small animal escapes from a cage or is dropped during a manipulation, there is no avenue of escape available from the room. In these rodent rooms, baited live traps are used as standard practice as an extra precaution so that, in the event an animal escapes into the room, the valuable research animal can be recovered alive. All cages and bedding are decontaminated in an autoclave prior to removal from the containment facility. Should an animal burrow in bedding and not be transferred to a fresh cage prior to removal from the animal room, it would not survive the decontamination process.

The BSL-3 animal rooms are also accessed via air lock through interlocking doors. These doors are fitted with "sweeps" and open inward to preclude animal escapes. Small rodents housed in BSL-3 animal rooms are maintained in micro-isolator cages in ventilated cage racks that serve as a primary barrier preventing escape of the animal. As in the BSL-4 animal room, baited live traps are employed as a secondary measure to prevent escapes and to preserve valuable laboratory animals. Daily animal observation is a matter of good husbandry practice and is required for accreditation of the RML animal care and use program. BSL-3 laboratories are, by design, removed from general access corridors, thus even further reducing the likelihood of an animal reaching an exterior door. Animal bedding and cages must also be decontaminated prior to removal from the containment facility. An animal hidden in bedding would not survive the decontamination process.

The potential risk to the public from an infected animal is so minimal that it can be described as zero.

Biological Material Shipment. The packaging, labeling, and transport of etiologic agents (see **Appendix C**) are regulated 42 CFR 72 (Interstate Shipment of Etiologic Agents); 49 (CFR 172 and 173 U.S. Dept. of Transportation regulations concerning shipment of hazardous materials); 9 CFR 122 (U.S. Dept. of Agriculture [USDA]-Restricted Animal Pathogens, and International Air Transport Association (IATA) rules. In addition, special rules apply for the transport of materials regulated by the U.S. Food and Drug Administration (21 CFR 312.120, Drugs for Investigational Use in Laboratory Research Animals or in Vitro Tests). Recent legislation (the USA PATRIOT Act, and the Public Health Preparedness and Bioterrorism Response Act of 2001) have further strengthened the regulations controlling transport of certain etiologic agents, referred to as select agents, to include controls over possession and use. The RML is registered with the Centers for Disease Control and Prevention and the U.S. Department of Agriculture for possession, use, and transport of these agents. A responsible official is designated at RML and approved by the regulating agencies to oversee the shipping, receipt, and usage. Packaging requirements are strictly implemented in accordance with IATA regulations.

Worldwide, there have been no cases of illness attributable to the release of infectious materials during transport, although incidents of damage to outer packaging of properly packaged materials have been reported (World Health Organization, 2002; U.S. Department of Transportation, 2001).

The risk to the community surrounding RML and specifically the Integrated Research Facility from transport of infectious agents or other biologically derived material is negligible.

Risk Assessment Scenarios. The NIH has performed a quantitative risk assessment of release of an infectious agent to the surrounding Hamilton community from the proposed BSL-4 Integrated Research Facility at RML. The quantitative risk assessment was driven by reasonably foreseeable, credible threat scenarios. It addresses spills and work disruption; safety system operation and potential failures; and fire. The modeling tool used to perform these analyses was the Maximum Possible Risk (MPR) model developed by the NIH. Anthrax, in spore form, was chosen as the worst-case scenario agent based on public health impact and dissemination potential (Rotz *et. al.* 2002). Anthrax itself is not a BSL-4 agent, but it does pose a higher potential hazard to workers in the immediate vicinity and the surrounding community upon accidental release than the BSL-4 viral agents. This is due to its innate resistance to environmental factors (e.g. sunlight, lack of humidity, etc.) that normally tend to inactivate viruses and ease of airborne dissemination. Preliminary range finding studies were performed simulating accidental laboratory releases of 10 billion anthrax spores to determine the number of respirable particles generated that become airborne. Approximately 400,000 respirable particles were produced in the range finding studies of simulated laboratory accidents and were available to become and remain airborne. These data were introduced into the MPR model to generate a very cautious, quantitative estimate of the risk for each of the scenarios. The estimate of risk is based on potential dispersion of accidentally released spores approximately 100 meters from the BSL-4 ventilation exhaust stack, which represents the nearest residence in the surrounding Hamilton community. Risk scenarios evaluated included those with countermeasures in place and functioning properly, as well as system failure scenarios. Assumptions made for input into the MPR model are as follows:

1. A release point is assumed. For laboratory spills, it is the top of the building exhaust stack. The exhaust velocity is not used in calculation of the dispersion pattern in the MPR, therefore decreasing potential area in which the spores can disperse within the model. A dispersion pattern is also assumed. It is a horizontal cone starting at the release point and extending 100 meters.
2. All the spores are assumed to go in one direction, as if the worst possible wind pattern is at play. In any actual incident, turbulence would, in fact, disperse the spores more broadly so that the concentration would fall to harmless levels well before any spores left the RML grounds.
3. Independent of the dispersion pattern, a pathogenic total cumulative level of spores, e.g. 500, is assumed and is an input to the model. Documented evidence suggests that the pathogenic level is greater than 500 spores over an eight-hour period (Brachman 1966). In addition, a respiration rate of 12 liters per minute and total exposure time of 20 minutes is assumed. From these inputs, a pathogenic concentration, in spores per liter, can be computed. For example, a concentration of 2.08 spores per liter, breathed for 20 minutes at the rate of 12 liters per minute would accumulate to 500 spores. This corresponds to an airborne concentration of 2083 spores per cubic meter of air.
4. The pathogenic concentration is then compared to the concentration produced by the dispersion model at and outside the 100-meter radius from the lab in which the actual dispersed concentration could present a temporary hazard.

The MPR analysis (based on the exposure time and respiration rate) for the Integrated Research Facility BSL-4 laboratory uses a cautious approach of "maximum possible risk." Specifically, numerous simplifying assumptions are used that we know for certain are more unfavorable than any credible assumptions. For example, we assume that spores, once released, populate a simple cone or spherical pattern; in fact, they would certainly disperse in a far more complex pattern that would inevitably reduce them to nonpathogenic concentrations more rapidly than the MPR analysis will allow. This approach makes the calculations easy to understand, avoids controversies over the details of turbulent dispersion, and gives extra confidence since the actual risks are certain to be less than the risks presented in the analysis. Scenarios for the

BSL-4 facility subjected to MRP analysis are specified below:

1. A researcher is working within a Class 2 BSC that is ducted and located within a BSL-4 laboratory. He is handling a 15 cubic centimeter (cc) conical tube containing a powder-like preparation of purified anthrax containing 10 billion spores. The cap fits loosely. The researcher accidentally drops the tube on the bare, stainless steel surface of the properly operating BSC. The cap comes off of the tube upon impact and a visible cloud of spores is released within the cabinet.

The cabinet is exhausted through a dedicated heating, ventilating, and air conditioning (HVAC) system for the BSL-4 laboratory that contains two properly seated and gasketed high-efficiency particulate air (HEPA) filters, in series, in the exhaust system. The air change rate within the room is 12 air changes per hour (ACH). The typical laboratory dimensions have been provided. The laboratory has a 10-foot ceiling. The exhaust stack height is five meters. The total exhaust air volume from the BSL-4 laboratory is 17,018 liters per second. The exhaust velocity is 20 meters per second.

What is the potential for release of anthrax spores to the external outdoor environment?

The calculated potential release to the environment described in this scenario would be 0.000011 spores. Since release of a partial spore is not feasible, this number is practically rounded to zero.

What is the probability of public health harm?

The safety features designed into the laboratory would prevent even one spore being breathed by an individual in the nearest residence as a consequence of an accidental laboratory spill.

2. A researcher is working within a Class 2 Biological Safety, Type A that is not ducted and located within a BSL- 4 laboratory. He is handling a 15 cc conical tube containing a powder-like preparation of purified anthrax containing 10 billion spores. The cap fits loosely. The researcher accidentally drops the tube on the bare, stainless steel surface of the properly operating BSC. The cap comes off of the tube upon impact and a visible cloud of spores is released within the cabinet.

The cabinet recirculates HEPA-filtered air to the laboratory room; the air is then exhausted through a dedicated HVAC system for the BSL-4 laboratory that contains two properly seated and gasketed high efficiency particulate air (HEPA) filters. The air change rate within the room is 12 air changes per hour (ACH). The typical laboratory dimensions have been provided. The laboratory has a 10 ft. ceiling. The exhaust stack height is 5 meters. The total exhaust air volume from the BSL-4 laboratory is 17,018 liters per second. The exhaust velocity is 20 meters per second (m/s).

What is the potential for release of anthrax spores to the external outdoor environment?

The calculated potential release described in this scenario would be 0.000011 spores. Since release of a partial spore is not feasible, this number is practically rounded to zero.

What is the probability of public health harm?

The safety features designed into the laboratory will prevent even one spore being breathed by an individual in the nearest residence as a consequence of an accidental laboratory spill.

3. A researcher is working within a Class 2 BSC that is ducted and located within a BSL-4 laboratory. He is handling a 15-cc conical tube containing a powder-like preparation of purified anthrax containing 10 billion spores. The cap fits loosely. The researcher accidentally drops the tube on the bare, stainless steel surface of the properly operating BSC. The cap comes off of the tube upon impact and a visible cloud of spores is released within the cabinet.

The cabinet is exhausted through a dedicated HVAC system for the BSL-4 laboratory; however, both HEPA filters were accidentally left out of the filter housings. The air change rate within the room is 12 air changes per hour (ACH). The typical laboratory dimensions have been provided. The laboratory has a 10-foot ceiling. The exhaust stack height is five meters. The total exhaust air volume is 17,018 liters per second. The exhaust velocity is 20 meters per second.

What is the potential for release of anthrax spores to the external, outdoor environment?

The calculated potential release to the environment described in this scenario would be 1 spore per 8,727 cubic meters of air.

What is the probability of public health harm?

Due to the pressure monitoring devices and alarms included in the building design and the installation, maintenance, testing, and certification program for all HEPA filter installations, the exhaust system would shut down when the HEPA filters did not operate. Therefore, there should not be any biological material (spores) released into the environment. Even if these systems failed and the entire number of aerosolized spores was exhausted from the laboratory, the concentration under the maximum possible risk model would still be only one spore per 8,727 cubic meters of air. As a point of reference, the average breathing rate for a human is 12 liters per minute (1000 liters = one cubic meter), meaning that a human breathes approximately 6,307 cubic meters of air in an entire year.

The risk of public harm is so minute that it may be considered zero.

4. A researcher is working within a Class 2 BSC that is ducted and located within a Biosafety Level 4 laboratory. He is handling a 15-cc conical tube containing a powder-like preparation of purified anthrax containing 10 billion spores. The cap fits loosely. The researcher accidentally drops the tube on the floor of the BSL-4 laboratory. The cap comes off of the tube upon impact and a visible cloud of spores is released within the laboratory room.

The cabinet is exhausted through a dedicated HVAC system for the laboratory; however, both HEPA filters were accidentally left out of the filter housings. The air change rate within the room is 12 air changes per hour (ACH). The typical laboratory dimensions have been provided. The laboratory has a 10-foot ceiling. The exhaust stack height is five meters. The total exhaust air volume is 17,018 liters per second. The exhaust velocity is 20 meters per second.

What is the potential for release of anthrax spores to the external, outdoor environment?

Taking the maximum possible risk approach, assuming that there is no loss of aerosolized spores through sedimentation or impaction on the duct work, approximately 400,000 respirable spores could potentially be released from the BSL-4 laboratory into the dispersal zone resulting in a concentration of one spore per three cubic meters of air.

What is the probability of public health harm?

Using an average breathing rate for a human of 12 liters per minute (1,000 liters equals one cubic meter), an individual would have to breathe one spore per three cubic meters of air concentration for over four hours before even one spore would be inhaled. Clearly, the conservative pathogenic concentration used in this assessment of 500 spores over eight hours would never be achieved. Furthermore, due to the pressure monitoring devices and alarms included in the building design and the installation, maintenance, testing, and certification program for all HEPA filter installations, the likelihood of this modeled release occurring is further reduced. The risk of public harm is so minute that it may be considered zero.

5. A researcher is working within a Class 2 BSC that is ducted and located within a BSL-4 laboratory. He is handling a 15-cc conical tube containing a powder-like preparation of purified anthrax containing 10 billion spores. The cap fits loosely. The researcher accidentally drops the tube on the floor of the BSL-4 laboratory. The cap comes off of the tube upon impact and a visible cloud of spores is released within the laboratory room. At this exact moment, the building is struck by a major electrical outage and the HVAC system fails.

What is the potential for release of anthrax spores to the external, outdoor environment?

None. The Biosafety Level 4 laboratory HVAC system is designed with numerous safety controls in place. In the event that either the exhaust or supply systems shut down, electronic interlocks on these systems assure that the laboratory is not pressurized. In the event of a total electrical outage, when neither exhaust nor supply air is provided to the laboratory, the pressure differential will drop to zero and the room becomes static with regard to airflow. Additionally, positive pressure bubble dampers, installed for decontamination purposes on BSL-4 laboratories, close and isolate the air in the laboratory. The anthrax spores would not be released into the environment because there would be no pressure in the laboratory to push the air through the series of two HEPA filters. The HEPA filters would continue to provide a physical barrier against release of spores even in the shut-down mode.

What is the probability of public health harm?

None. No spores would be released to the environment.

6. A researcher handling anthrax cultures is hurrying to finish work on a Friday afternoon. Freshly inoculated *B. anthracis* cultures on 5% sheep blood agar plates are placed in the incubator. She places a stock of anthrax spores (10 billion spores in 10 mL of phosphate buffered saline in a 50-cc polypropylene tube) in the secure laboratory refrigerator. In her haste, she does not notice that a heated water bath has been left on and has no water left in it. The water bath does not have an automatic "over temp" switch-off. Sometime late Saturday evening, the water bath overheats and a small fire ignites. Some small cardboard boxes are stored on a shelf above the water bath. The room is sprinklered and alarmed. The Hamilton Fire Department responds to the alarm within four minutes.

What is the potential for release of anthrax spores to the external, outdoor environment?

None. The spores are secured in a locked refrigerator consistent with Department of Health and Human Services Select Agent storage guidance for compliance with the USA PATRIOT Act. The laboratory sprinkler system will discharge as soon as the cardboard combustibles begin to burn, dousing the fire. In the event that the sprinkler fails to completely douse the fire, the Hamilton Fire Department also responds within approximately four minutes. Additionally, one-hour fire rated walls prevent expansion of the fire beyond this laboratory module.

What is the probability of public health harm?

None.

Transportation

Potential impacts from traffic associated with the Proposed Action were evaluated in a residential portion of Hamilton, Montana, where most traffic entering and leaving the RML campus would occur. This area is defined by U.S. Highway 93 North on the east, Ravalli Street on the north, 8th Street on the west, and the southern property line of the RML campus on the south. The amount of existing resident and RML traffic through this area was compared to the estimated additional traffic that would be associated with the Integrated Research Facility.

Based on a July 1995 aerial photograph of the area (NRIS 2002) and property line coordinates available from the Montana Department of Administration (1999), approximately 204 residences are located within the residential area described above. Presently, 250 RML employees (see Section 3.3.2) travel through the area. The number of permanent federal employees would ultimately increase to 350 (see Section 4.2.1). Most of the traffic to and from RML and within the adjacent residential area occurs during the morning and evening commute periods. Peak hour travel during the evening commute is 0.79 trips per household and 0.45 trips per employee (Morrison Maierle 2002).

RML traffic is presently 41 percent of the area's peak hour traffic and would ultimately become 48 percent of the area's traffic with completion of the Integrated Research Facility (see **Table 4-1**). The difference between current and predicted RML employees traffic is 45 trips. When divided by the current number of trips (274), this is a 16 percent increase due to operation of the Integrated Research Facility.

Discussions with Hamilton's city administrator reveal that delivery services to RML would not noticeably change after expansion of the facility. USPS, UPS, FedEx, freight services etc., would continue to use current routes to enter and leave the campus. Administrative support traffic (i.e., errands, deliveries) would be similar to the present condition. Local residents would experience little additional traffic during the day.

The primary approach to RML is from Ravalli Street and South 4th Street (a local collector). South 7th Street is also shown as a local collector in the 2002 Hamilton Transportation Plan, but it would require upgrades (See Section 3.1.1) to function effectively as a local collector.

Table 4-1. Peak Hour Traffic (Current and Expected)		
	2002	**2006**
Residential		
Residences	204	204
Trips	161	171*
RML		
Employees	250	350
Trips	113	158
Total Trips	**274**	**329**

* Reflects a 1.5% increase in traffic per year.

Periods of increased security at RML may cause increased on-street parking adjacent to RML to avoid entry delays.

Transportation of agents would continue to meet requirements outlined in **Appendix C**.

4.2.1.2 No Action

Population and Demographic Trends

Population growth would continue at the current pace under the No Action Alternative (**Table 4-2**). Between 8,000 and 18,000 persons are projected to relocate to Ravalli County by 2010. People are choosing to move to Ravalli County primarily for quality of life issues, not job opportunities.

Table 4-2. Population Projections			
Area	**2000 Pop.**	**2010 Pop. (2%/year)**	**2010 Pop. (4%/year)**
Ravalli County*	36,070	7,930 new 44,000 total	17,930 new 54,000 total
City of Hamilton	3,705	695 new 4,400 total	1,795 new 5,500 total

*Based on information in the Ravalli County Economic Needs Assessment (Swanson 2002).

Housing

Under the No Action alternative, annoyances attributed to the proposed Integrated Research Facility construction phase would not occur, and neighbors would not be as concerned about the biological agents used at the Integrated Research Facility.

Housing starts would continue at the same pace as under the Proposed Action, although houses may remain on the market longer with fewer qualified buyers. Housing prices or property values are expected to remain at current levels and to increase or decrease following the real estate market in Hamilton.

Community Safety

Current levels of community services, emergency response training and programs, and infrastructure would not change under the No Action Alternative. Infectious diseases would still be studied in the BSL-2 and BSL-3 laboratories at RML. Reasonably foreseeable actions such as completion of community emergency response protocols are defined in Cumulative Effects, below.

Transportation

The current use of streets by neighborhood residents and RML employees would continue.

4.2.2 Cumulative Effects

Population and Demographic Trends

Population change results from both migration (the number of people moving to an area and away from an area) and natural change (the number of area births and deaths). Natural change alone would lead to a decreasing population in Ravalli County because of a decreasing birth rate and a stable death rate. Assuming that recent population growth trends based on net in-migration to the valley continue during the decade, the Ravalli County Economic Needs Assessment (Swanson 2002) predicts that growth will range from two to four percent per year because "the factor most affecting future growth is what will happen to perceptions of the valley's attractiveness as this fast growth continues and increasingly takes its toll on the very thing enticing more people to move to the valley – the area's scenic qualities and rural character." The population may grow to between

44,000 and 54,000 people by 2010 (**Table 4-2**), leading to lower-end increases of at least 8,000 people, or approximately 800 people per year, and up to 18,000 people, or 1,700 people per year on the higher end. These growth projections do not include additional employment at RML.

Housing

According to the Ravalli County Growth Policy (2002), future trends are difficult to predict, although continued, scattered residential development is expected. Between 3,200 and 6,800 new homes would be needed by 2010 to accommodate projected growth. According to the Ravalli County Economic Development Authority, about 500 homes have been constructed each year since 2000 at prices ranging from $150,000 to $170,000. Commercial and industrial development is expected near existing service centers and along U.S. Hwy 93. Missoula would continue to be the regional economic center.

Community Safety

Under the Proposed Action or No Action alternatives, reasonably foreseeable actions would be completed to improve community safety, including: construction of a new perimeter fence; relocating the main and receiving gates; construction of a new security guard station; installation of a card reader system; installation of security cameras on campus; construction of a new receiving building; and construction of a landscaped crash barrier at 4th and Grove Streets in Hamilton. Additional security guards and NIH police officers would be hired to provide added security and safety. Procedures and protocols would also be established with local emergency response agencies to address responsibilities of each agency in the event of an emergency at RML. Work with infectious agents at the BSL-2 and BSL-3 levels would continue in existing laboratories.

Transportation

Residential traffic is expected to increase at a rate of 1.5 percent per year (Morrison Maierle 2002). Experienced and expected peak hour traffic for 2002 and 2006 is shown in **Table 4-1**. The predicted increase in traffic from residents is four percent (10 trips). When added to the 16 percent increase from the Integrated Research Facility, the result is an overall 20 percent increase.

Reasonably foreseeable actions (described on page 4-1), would result in changes in traffic patterns after construction for employees of RML, as well as changes in the parking situation. Under either alternative, combined with reasonably foreseeable actions, neighborhood parking and traffic would be expected to improve. More off-street parking would be provided for cars at the entrance gate. Additional on-campus parking would be provided for visitors and employees, alleviating parking concerns for residents living near RML. Deliveries to RML would also occur through a gate along the northern boundary of the property near 5th and 6th streets, reducing congestion problems associated with the existing gate at 4th and Grove streets.

4.3 ECONOMIC RESOURCES

4.3.1 Direct and Indirect Effects

4.3.1.1 Proposed Action

Income

According to the Ravalli County Economic Needs Assessment (Swanson 2002), RML is the fourth most important asset of current and potential key economic assets of the county because it "provides area employment for highly educated and well-trained workers and brings large infusions of outside money to the area that finance the laboratory's work." The mere presence of such a laboratory in an expanding field of bioscience research creates an environment for certain types of business development that may be associated with the laboratory's work. The scientific sophistication of this work requires that such businesses have high quality and highly trained workers. This creates the opportunity for expansion of higher paying, higher quality jobs.

The Proposed Action would have direct economic impacts on both the City of Hamilton and Ravalli County throughout construction and operation. Construction workers may temporarily affect the rental market, which is already limited in Hamilton. Sufficient numbers of qualified construction workers may be hard to find in Ravalli County, and the majority of workers may commute from Missoula County for the duration of the Project.

Local retail trade would increase during the construction period. Average construction wages in Ravalli County were $23,653 in 2000. Total annual construction wages are estimated to be $4.7 million. At the current estimated economic multiplier for wages paid from "outside" the community (Nicholson 2002), the maximum expected increase in economic activity would be $18.9 million over the two-year construction period.

When the facility is fully operational, up to 100 new employees would be hired. Because of the specialized nature of the work, the work force would probably be recruited predominately at the national level (65 percent) and from colleges and universities in Montana. The total wages to be paid per year is estimated by RML at $6.6 million. Added to the current $10.4 million annual payroll, RML would contribute $17 million in wages annually. At the current estimated economic multiplier for wages paid from outside the community (Nicholson 2002), RML would contribute $34 million annually to the local economy. Government job growth is particularly valuable to the community because of the relatively high wages that add to the economic base (Nicholson 2002). RML and the proposed Integrated Research Facility meet community economic development goals in the Ravalli County Economic Needs Assessment (Swanson 2002), Ravalli County Growth Policy (2002), and the City of Hamilton Comprehensive Master Plan (1998).

Government and Public Finance

Public revenues would increase with increased income tax on construction and operation payrolls. Public revenues would also increase from the incomes of spouses and older children of RML employees, increased number of vehicles being licensed, and property tax revenues based on new homes and increased property assessments. Property taxes would increase as the needs of the county, cities, and special districts increase with new populations. Revenue or cost increases attributed to the Project would range from one to three percent of the total increased revenue and costs from the projected 8,000 to 18,000 new residents by 2010 (Swanson 2002).

4.3.1.2 No Action

Income

The No Action Alternative would not have direct economic impacts. There would be a minor increase in security staff at RML, but an opportunity to stabilize the local economy with government jobs would be lost, slowing the realization of local economic development goals.

Government and Public Finance

There would be no direct effect from No Action on government and public finance.

4.3.2 Cumulative Effects

4.3.2.1 Proposed Action

The Proposed Action would add new residents to a rapidly growing area, possibly adding stress to community service providers and infrastructure. The potential negative cumulative impacts of Corixa's expansion would include increased demands for housing, schools, and infrastructure. Based on the analyses of socioeconomic impacts for the Proposed Action, there would be adequate housing, school resources, and city infrastructure to accommodate the cumulative impacts of Corixa's and RML's expansions. Positive cumulative impacts from Corixa's expansion would be creation of new high-paying jobs and economic stability for Hamilton and Ravalli County.

4.3.2.2 No Action

Cumulative effects would occur from Corixa's expansion, which would have the same cumulative effects as the Proposed Action.

4.4 NOISE

4.4.1 Direct and Indirect Effects

4.4.1.1 Proposed Action

Construction Noise

During construction of the Integrated Research Facility at RML, short-term noise sources would include operation of heavy mobile equipment (e.g., bulldozers, backhoes, cranes, heavy trucks, pumps, generators, compressors, loaders, and compactors), use of power tools (e.g., jackhammers), and use of hand tools (e.g., hammers and drills). Equipment operation would vary considerably during the project and different days. During construction, heavy mobile equipment does not normally run continuously.

Each individual piece of construction equipment can typically generate noise levels up to 90 dBA at a distance of 50 feet from the equipment (USDOT 1995). However, equipment noise can vary considerably depending on age, condition, manufacturer, and use. Since noise is intermittent and the source can vary from day to day, it is difficult to determine the length of time that noise from a particular piece of equipment would persist during normal construction activities. The following construction noise level predictions are based on a conservative assumption that there would be five pieces of large mobile construction equipment operating simultaneously. Calculations indicate that the typical construction noise generated may equal the following approximate noise levels:

- 75 to 90 dBA along the north property line;
- 50 to 80 dBA along the south property line;
- 50 to 80 dBA along the east property line; and
- 65 to 85 dBA along the west property line.

The RML Campus Noise Level Criteria exempts construction noise activities, provided that the construction occurs between 7:00 am and 5:00 pm (Big Sky Acoustics 2003). Construction noise levels would be audible at the receptors located in the neighborhood adjacent to the RML campus. Noise may be considered intermittently adverse during various construction phases. Construction noise normally occurs during the day, and residents are generally less sensitive to noise during the day than at night. Construction noise mitigation measures are described in Chapter 2.

Integrated Research Facility

Noise sources associated with new equipment for the Integrated Research Facility include exhaust fans, air-handling units, cooling towers, and chiller operating simultaneously (for direct effects). Measures to reduce noise in the new operation are included in the design and described in Chapter 2.

Noise levels (**Table 4-3**) from the Integrated Research Facility due to simultaneous operation of the exhaust fans, air-handling units, cooling towers, and air-cooled chiller without the generator (typical daytime operations) would be designed to be less than 55 dBA on the property lines during the daytime. As indicated in **Table 4-3**, noise levels from the RML campus would generally be reduced from current levels. Testing of the emergency generator (which would only occur during the daytime) is expected to raise the noise level slightly, but daytime noise limits would not be exceeded at the property lines. At night, noise levels would not exceed 50 dBA. The Proposed Action would meet RML's new noise guidelines.

**Table 4-3.
Estimated Cumulative Noise Levels**

Location*	Current	Noise Level (dBA)
1	48	30-35
2	52	30-35
3	52	35-40
4	51	40-45
5	50	45-50
6	44	45-50
7	41	45-50
8	44	50-55
9	43	40-50
10	50	40-45
11	46	35-40
12	47	35-40
13	49	35-40

* See Figure 3-1.

4.4.1.2 No Action

Table 4-3 indicates the anticipated noise levels under the No Action Alternative for locations 1, 2, 3, 4, 9, 10, 11, 12, and 13 (**Figure 3-1**). Locations 5 though 8 would be lower, approximately 35 dBA, as noise in those locations would not be affected by the emergency generator. Noise mitigation devices have been ordered, but not all have been installed. Under the No Action Alternative, in all locations, noise would be similar or slightly reduced from current levels.

4.4.2 Cumulative Effects

Under both the Proposed Action and No Action alternatives, reasonably foreseeable changes in the entrance gate and employee parking area could result in a reduction in noise levels on the east side from traffic, while the north side may experience a slight increase. Additional traffic noise would be confined to periods when employees are arriving and departing. These changes would not exceed RML's draft noise guidelines.

Reasonably foreseeable noise reduction features would result in a slight reduction in noise overall as shown in **Table 4-3**. In some instances, noise would be reduced more than 10 dBA. **Table 4-4** describes how changes in noise levels are perceived. Noise is predicted to be approximately 50 dBA at the south property line and 51 dBA on the west side (2400 feet inside the property line) during daytime hours, meeting RML's draft guideline. Since predicted noise levels from the Proposed Action would be less than the current noise, cumulative effects for the Proposed Action and No Action are the same.

Table 4-4.
Perception of Change in Loudness

Change in Sound Level (dBA)	Apparent Change in Loudness to a Person
±1	Imperceptible
±3	Barely audible
±6	Clearly audible
±10	Half as loud or twice as loud as the original noise (significant change)
±20	One quarter as loud or four times as loud as the original (very significant change)

4.5 VISUAL QUALITY

4.5.1 Direct and Indirect Effects

4.5.1.1 Proposed Action

The extent to which the Proposed Action would affect visual quality depends upon the amount of visual contrast created between the proposed facility and the existing condition. The main content of the Proposed Action is construction of the Integrated Research Facility building. In addition to construction of the laboratory facility, other components of the Proposed Action include an addition to the boiler plant and relocation of the chiller and associated fuel tank. These elements would be visible changes to the existing RML campus from Viewpoint 1 (**Figure 4-2**). Ventilation stacks on the Integrated Research Facility would not be visible from Viewpoint 1.

The primary visual impact of the Proposed Action would be addition of a large building introduced into an area of many smaller buildings (**Figure 4-2**). Use of red brick color and texture would blend with existing material throughout the campus. The boiler plant addition would be directly adjacent to the east side of Building 26. The addition would be smaller, but the additional stack would be the same height as the existing stack. The existing and proposed stacks would be about 40 feet apart and 37 feet high. Both stacks would offer linear contrast to surrounding structures.

Proposed landscaping would have an impact on visual quality. This area of the RML campus would be modified from existing vegetation (weeds) to grass and trees placed around the building and its associated paved parking area (reasonably foreseeable action). Open storage areas would be eliminated or relocated away from view. All construction trailers would be removed from RML.

4.5.1.2 No Action

There would be no change from the existing condition described in Chapter 3. Some of the construction trailers would be removed from RML.

4.5.2 Cumulative Effects

Reasonably foreseeable actions would have a visual impact on the RML campus. The addition of a nine- foot fence would interrupt the view of much of the ground level activity within the campus. Street side landscaping, including a sidewalk, would add pleasant views to the campus exterior. Other reasonably foreseeable actions include addition of buildings for visitors, receiving, and storage. Future construction of the receiving and storage building would partially or completely block the view of the Integrated Research Facility from Viewpoint 1.

4.6 HISTORICAL RESOURCES

The analysis of visual impacts on the Historic District requires an assessment based on the Criteria of Effect and Adverse Effect (36CFR 800.9). The Criteria of Effect are listed in Section 800.9(a) and state, in part, that "an undertaking has an effect on a historic property when the undertaking may alter characteristics of the property that may qualify the property for inclusion in the National Register."

The Criteria of Adverse Effect, listed in Section 800.9(b), results in one of three possible outcomes: no effects, no adverse effects, and adverse effects. No adverse effect occurs when there could be an effect, but it would not harm characteristics that qualify the property for the National Register. Adverse effect occurs when the integrity of those characteristics that qualify the property for the National Register could be diminished.

Impacts are measured by the visual character of the historic district, defined by pattern elements and pattern characters. The pattern elements are form, line, color, and texture. The pattern characters are dominance of development, scale of development, diversity of development, and continuity of development pattern (Montana State Historic Preservation Office, 1994). A score of:

- 0 indicates the element or character is absent;
- 1 indicates the element or character is present;
- 2 indicates the element or character has a moderate prominence;
- 3 indicates the element or character has a high prominence within the view.

4.6.1 Direct and Indirect Effects

4.6.1.1 Proposed Action

The Integrated Research Facility, Building 28, would be a three-story Modern Architecture style structure located north of Building 25, set back from the Historic District. The north elevation would be comprised of a glass curtain wall with projected horizontal and vertical mullions. The other three elevations would share characteristics, including common bond cement blocks on the main story, metal doors, metal clad single-pane fixed windows, and corrugated metal siding on the remaining stories with a pre-finished metal roof. The boiler plant expansion would be an addition to Building 26. The addition would be two stories that would extend across half of the east elevation of Building 26 and a stack extending upward the same distance as the current one (37 feet) on the existing boiler plant. The expansion would have common bond concrete masonry on the main floor with metal siding above. Metal clad fixed windows would be located on the south elevation and the roof would be pre-finished metal.

The RML Historic District is only partially visible from the site of the proposed Integrated Research Facility (**Figure 4-3, Figure 4-4,** and **Figure 4-5**).

Several existing structures, including Buildings 26, 20, 13, and 16, block the view of the historic district from the proposed site. Only portions of Buildings 7 and 6 in the historic district are visible from the site of the Integrated Research Facility. The boiler plant expansion would be located on the east elevation of Building 26. Building 13 blocks the view of the Historic District from the proposed site of the Integrated Research Facility; however, the stack for the new boiler would be visible.

The visual character pattern elements can be characterized by scores of 1 for form, 1 for line, 1 for color, and 1 for texture. A score of 1 reflects that the pattern elements are present in the view shed.

The combined score of pattern elements is 0.25. The pattern characters of dominance, scale, diversity, and continuity have the score of 0.25.

Applying the Criteria of Effect results in a finding of "no adverse effect" on the Historical District. The no adverse effect rating recognizes there could be an effect on the Historic District, but that the effect would not be harmful to the qualities that are inherent in the RML Historic District.

4.6.1.2 No Action

Under this alternative, there would be no change in the visual impact and therefore there would be a finding of no effect.

4.6.2 Cumulative Effects

Reasonably foreseeable actions could have an effect on the historical resources of RML.

Graphics/projects/rml/simulation

Source: CUH2A Smith Carter (2003)

Visual Simulation of Proposed IRF
RML Integrated Research Facility FEIS
Hamilton, Montana
FIGURE 4-2

Figure 4-3. Overview, facing northeast toward proposed location

Figure 4-4. Overview proposed location, facing east toward historic district

Figure 4-5. Overview from physical plant, Building 7, facing west toward proposed construction site.

fence and the road barrier at the corner of 4th and Grove streets would occur within the historic district. The new visitor center and guard station would be visible from the Historic District. At this time, the State Historic Preservation Office (SHPO) has been contacted by RML concerning the reasonably foreseeable actions to allow for review of potential historical resource effects. Since final design of the reasonably foreseeable action has not been completed, continued coordination with SHPO would be completed by RML to ensure issues are addressed, and would result in no adverse effect on the historic district.

4.7 AIR QUALITY

4.7.1 Direct and Indirect Effects

4.7.1.1 Proposed Action

Gaseous and particulate air contaminant emissions are generated during normal laboratory operations at RML. The Proposed Action would increase the overall emissions at RML. Buildings would require steam for heating, autoclaving, and other needs.

Electrical power and natural gas for the Integrated Research Facility and support buildings would be provided by the local utility. Backup (emergency) power for the new laboratory would be provided by a new diesel generator. Incinerator use is estimated to increase from approximately two to three days a week to three to four days a week.

Emissions

Emission points associated with the Proposed Action at RML would not be any closer to population centers or critical air quality receptors since the new laboratory building and boiler would be within the perimeter of RML campus and existing incinerators would be used.

The State of Montana recognizes the use of incineration as a legitimate means of handling infectious or pathological waste. MCA 75-10-1005(4)(a) states, "Treatment and disposal of infectious waste must be accomplished through the following methods: (i) incineration with complete combustion...(ii) steam sterilization...or (iii) sterilization of standard chemical techniques..."

Construction activities associated with the Proposed Action would generate short-term air impacts. These impacts would result from fugitive dust and gaseous emissions associated with construction equipment. Fugitive dust would be controlled through dust control measures. Gaseous emissions would be controlled through management of construction work hours. Overall, fugitive dust emission resulting from current exposed ground areas would decrease due to site improvements such as vegetation/landscaping and asphalt parking areas.

Air quality impacts resulting from additional natural gas usage at RML are anticipated to be minor (MDEQ 2003). Impacts on air quality would not result from emissions due to increased use of natural gas since sufficient capacity is available from the utility. Additional exploration for natural gas would not be needed to supply the Integrated Research Facility. Additionally, no air quality impacts would result from increased electrical demand since electricity is supplied by Kerr Dam, near Polson, Montana, which has surplus power on the grid.

Table 4-5 contains information on potential emissions from RML, including those associated with the Proposed Action. Values are estimated maximums from the facility and are based on 8,760 operating hours per year (24 hours per day and 365 days per year). For those components that have conditions limited by an operating permit (e.g., operational hours less than 8,760), those limits were used in the potential emission calculation shown in the table.

Air Quality Permit

The air quality permit specifies limits for incinerator charging rate, natural gas usage (for boilers and incinerators), and emergency generator run hours. The permit also specifies reporting requirements to document status of compliance with permit conditions. Additional activities that ensure facility compliance include emission testing and inspections by MDEQ. If the permit conditions are not met (e.g., emission limits exceeded), MDEQ may issue a notice of violation.

The air quality permit technical analysis conducted by MDEQ for permit 2991-04 includes the proposed boiler, emergency power generators, and increased incinerator. Based on review of the application and state and federal rules and regulations, MDEQ has determined that the proposed Project would comply with all applicable ambient standards and meet the provisions of ARM Title 17. MDEQ will continue to monitor activities at RML to ensure compliance with applicable air quality regulations (**Table 4-5**).

Class I Areas

The air modeling analysis conducted for RML predicted air emission would be within Montana and federal air quality standards. These emissions are not expected to visibly affect or modify air quality in Class I areas.

4.7.1.2 No Action

Emissions

Emissions would remain at current levels under the No Action Alternative (See **Table 4-5**).

4.7.2 Cumulative Effects

Under the Proposed Action, the minor increase in emissions would be added to emissions from the other 11 permitted sources in the county. A decrease in particulate matter emissions from reasonably foreseeable actions would occur as undeveloped areas are used for buildings and paved for parking. Since the Proposed Action would comply with ambient air quality standards, cumulative effects would be minimal.

4.8 WATER SUPPLY AND WASTEWATER

4.8.1 Direct and Indirect Effects

4.8.1.1 Proposed Action

Hamilton Water System

The CHDPW system is currently capable of producing a maximum of 2,350 gallons per minute (gpm). The highest production month in 2002 was July when an average of 1,786 gpm was produced (CHDPW 2002). This data indicates that there was about 560 gpm additional production capacity during the period of highest reported demand on the system (July 2002). A certain amount of water is lost through line leakage, recharging the shallow aquifer from which the groundwater is pumped. Assuming that 60 percent of this production capacity is lost to leaks in the Hamilton system, (see Water Supply section in Chapter 3), an

Table 4-5.
RML Emissions

Source	NOx		SOx		CO		PM_{10}		VOCs	
No Action Alternative (Existing) Emissions										
Incinerators (a)	0.8	tons/yr	0.7	tons/yr	0.8	tons/yr	1.6	tons/yr	2.6	tons/yr
	0.2	lbs/hr	0.2	lbs/hr	0.2	lbs/hr	0.4	lbs/hr	0.6	lbs/hr
Steam Generating	10.2	tons/yr	0.1	tons/yr	8.6	tons/yr	0.8	tons/yr	0.6	tons/yr
Boilers (a)	2.3	lbs/hr	0.0	lbs/hr	2.0	lbs/hr	0.2	lbs/hr	0.1	lbs/hr
Emergency Power	14.6	tons/yr	4.4	tons/yr	3.3	tons/yr	0.5	tons/yr	0.5	tons/yr
Generators	58.2	lbs/hr	17.7	lbs/hr	13.3	lbs/hr	2.0	lbs/hr	2.1	lbs/hr
Fuel Tanks	na		na		na		na		0.0	tons/yr
Preferred Alternative Emissions										
Incinerators (b)	1.2	tons/yr	1.1	tons/yr	1.2	tons/yr	2.3	tons/yr	4.0	tons/yr
	0.3	lbs/hr	0.3	lbs/hr	0.3	lbs/hr	0.5	lbs/hr	0.9	lbs/hr
Steam Generating	15.3	tons/yr	0.1	tons/yr	12.9	tons/yr	1.2	tons/yr	0.8	tons/yr
Boilers (b)	3.5	lbs/hr	0.0	lbs/hr	2.9	lbs/hr	0.3	lbs/hr	0.2	lbs/hr
Emergency Power	21.8	tons/yr	6.6	tons/yr	5.0	tons/yr	0.7	tons/yr	0.8	tons/yr
Generators	87.4	lbs/hr	26.6	lbs/hr	19.9	lbs/hr	3.0	lbs/hr	3.1	lbs/hr
Fuel Tanks	na		na		na		na		0.0	tons/yr
Potential to Emit (Maximum Permitted) Emissions										
Incinerators (c,d)	3.3	tons/yr	3.1	tons/yr	3.2	tons/yr	6.5	tons/yr	11.0	tons/yr
	0.8	lbs/hr	0.7	lbs/hr	0.7	lbs/hr	1.5	lbs/hr	2.5	lbs/hr
Steam Generating	42.4	tons/yr	0.3	tons/yr	35.6	tons/yr	3.2	tons/yr	2.3	tons/yr
Boilers (c)	9.7	lbs/hr	0.1	lbs/hr	8.1	lbs/hr	0.7	lbs/hr	0.5	lbs/hr
Emergency Power	60.4	tons/yr	18.4	tons/yr	13.7	tons/yr	2.1	tons/yr	2.1	tons/yr
Generators (e]	241.6	lbs/hr	73.5	lbs/hr	55.0	lbs/hr	8.2	lbs/hr	8.6	lbs/hr
Fuel Tanks	na		na		na		na		0.0	tons/yr

Note: NOx = nitrogen oxides; SOx = sulphur dioxides; CO = carbon monoxide; PM_{10} = particulate matter < 10 microns; VOCs = volatile organic compounds; lbs/hr = pounds per hour; tons/yr = tons per year; na = not applicable

(a) Based on actual facility natural gas usage March 2002 to February 2003: 204 million cubic feet/yr of natural gas
(b) Based on a 50% increase in fuel needs over existing usage
(c) Permit conditional limit of 847 million cubic feet/yr of natural gas
(d) Permit conditional limit of 3504 tons/yr
(e) Permit conditional limit of 500 hours/yr

Source: MDEQ 2003 (Potential to Emit)

additional capacity of about 226 gpm is available for new customers.

The number of employees at RML is expected to increase by approximately 30 percent with the completion of the Integrated Research Facility.

Water consumed at RML is used for drinking water, research experiments, sewage, and industrial process such as boiler water. Work that would be performed at the Integrated Research Facility would be similar to work performed elsewhere on the RML campus. Therefore, experimental, drinking water, and sewage uses may be expected to increase commensurate with the increase in workers. A new boiler is planned as part of the Integrated Research Facility construction so there would also be an increase in industrial usage. Based on this information, and Hemisphere's (2003) estimated current water usage for RML of 56,000 gallons per day, water consumption at RML would increase by up to 30 percent to about 73,000 gallons per day (an increase of about 17,000 gallons per day or 12 gpm) if the Integrated Research Facility were constructed. This compares with Hemisphere's (2003) estimate of 15,000 gallons per day of effluent from the Integrated Research Facility.

The estimated increase of 17,000 gallons per day represents about a one percent increase in the amount of water distributed by the CHDPW on a daily basis. With respect to available capacity, the Integrated Research Facility would use about 5.3 percent (12 gpm of 226 gpm) of system capacity. Increased demand for water created by operation of the Integrated Research Facility would have a minor impact on the CHDPW municipal water supply system, and the system would be able to handle the increased demand, even with an assumed leakage of 60 percent.

Section 4.2.1.1 estimated that 100 new employees would be added at the facility by 2006 and that households in Ravalli County have an average of 2.45 residents per household. Assuming that thirty percent of the new employees live in Hamilton, and assuming each household has 2.45 people, 30 new households having 75 new residents would result from employment at the Integrated Research Facility. If each person uses an average of 150 gallons per day, there would be an average increased daily usage of 11,250 gallons per day per household. Assuming that all 30 new households are single-family dwellings on half-acre lots and use an average of 1,305 gallons per day to irrigate lawns for 120 days per year, the average amount of water used per household for irrigation would be 12,871 gallons per day. If the estimated increase usage from RML is added to the new resident usage and irrigation, the total increase would be 41,121 gallons per day, or 28.5 gpm during the irrigation season. This would increase the daily quantity of water sold by the CHDPW by about six percent. The existing Hamilton water supply system can adequately supply water for the Integrated Research Facility and water for irrigation and other household purposes for 30 new households. Even if all the new employees chose to live in the service area of the water system, the amount of increased water usage is estimated at 55 gpm, or roughly 24 percent of the available capacity of 226 gpm.

Groundwater

Section 3.8 of Chapter 3 provides an estimate of the amount of water available in the shallow aquifer below Hamilton on a daily basis. An increased use of 17,000 gallons per day by the Integrated Research Facility is estimated to be 0.2 percent of the water available in the portion of the aquifer supplying Hamilton on a daily basis. An increase of 41,121 gallons per day (Integrated Research Facility, households, and irrigation) represents about 0.6 percent of the amount available in the limited portion of the aquifer supplying Hamilton on a daily basis. Therefore, the Proposed Action would depreciate the amount of groundwater available on a daily basis (daily flux in the aquifer) by less than 1.0 percent.

The estimate of aquifer yield clearly shows that groundwater supply is not a limiting factor with respect to construction of the Integrated Research Facility, and the estimate is conservative for several reasons. There is considerably more groundwater flowing beneath the Hamilton area than the calculations shown in Chapter 3, Section 3.8, account for. There are reportedly up to 2,400 feet of unconsolidated sediments underlying the shallow aquifer in Hamilton (USGS 2000). These are ancestral Bitterroot River Deposits that form another aquifer beneath the aquifer currently supplying water to Hamilton. This deeper aquifer contain a larger quantity of groundwater than the shallow aquifer that is currently being utilized. There are also unconsolidated sediments west of the Bitterroot River that are a source of water for many residences west of the river. Hamilton does not currently use these groundwater sources but could in the future, if needed.

Wastewater Treatment

Wastewater discharge at RML would increase the average load by about 17,000 gallons per day (Hemisphere 2003) to about 73,000 gallons per day upon completion of the Integrated Research Facility. The CHDPW wastewater treatment plant is currently operating below design capacity in terms of average and peak flow per day. New homes built in Hamilton as a result of new employees moving to the area would increase this further. An increase of 15,000 gallons per day of effluent from RML would use some of the additional plant capacity, but would not require an upgrade to provide additional treatment capacity. This compares with Hemisphere's (2003) estimate of 15,000 gallons per day of effluent from the Integrated Research Facility.

Solids removed from the effluent stream are collected as sludge and stored. The CHDPW has reached its solids handling capacity, and the city of Hamilton is planning to construct a temporary solids storage basin to meet current requirements in the interim until a facility expansion plan is prepared (HDR 2003). The CHDPW would need to upgrade solids handling capacity even if the Integrated Research Facility were not built.

The estimated volume of solids in RML's current wastewater stream is small relative to the volume of liquid (Lowry 2003). New operations at the Integrated Research Facility would increase the solids load in wastewater from RML. Based on concentration and solids volume data (Hemisphere Engineering 2003b) for wastewater leaving the Integrated Research Facility, the additional solids produced at the CHDPW as a result of the Proposed Action would be approximately 28 pounds per day, or 10,183 pounds per year. The amount of solids in Integrated Research Facility effluent was estimated using the following calculation from Metcalf and Eddy (1991):

$$M_{Solids} = Q_{Inf.} \times [(BOD_{RMLeff.} - BOD_{CHDPWeff.}) \times NVF + (TSS_{RMLeff.} - TSS_{CHDPWeff})] \times 8.34$$

Where:

M_{Solid} = Mass of removable solids in pounds (lbs)

$Q_{Inf.}$ = Flow rate from RML in million gallons per day (0.015 MG/day)

$BOD_{RMLeff.}$ = Biological Oxygen Demand in RML wastewater (200 mg/L)

$BOD_{CHDPWeff.}$= BOD limit in CHDPW effluent (10 mg/L)

NVF = nonvolatile fraction of BOD (70%)

$TSS_{RMLeff.}$ = Total Suspended Solids in RML wastewater (100 mg/L)

$TSS_{CHDPWeff.}$= TSS limit in CHDPW effluent (10 mg/L)

8.34 = conversion factor [(lbs/MG)/(mg/l)]

Approximately 1,000 to 1,200 pounds of solids per day are currently handled at the CHDPW. (Lowry 2003). The 28 pounds of additional solids generated by the Integrated Research Facility represents a 2.3 to 2.8 percent increase in solids load to the CHDPW wastewater facility.

The Proposed Action would not have an impact on the solids handling capacity at the CHDPW because the planned upgrade of the solids handling capacity at the facility would accommodate current and future needs of Hamilton as well as additional solids produced by the Integrated Research Facility.

4.8.1.2 No Action

Hamilton Water System

The No Action Alternative would not have an impact on water supplies in Hamilton or the Bitterroot Valley.

Groundwater

The No Action Alternative would not have an impact on the water source in Hamilton or the Bitterroot Valley based on the estimate of aquifer yield provided in Chapter 3, Section 3.8.

Wastewater

The No Action Alternative would not have an impact on wastewater treatment in Hamilton. The No Action would not have an impact on the solids handling capacity of the plant.

4.8.2 Cumulative Effects

Hamilton Water System

Corixa Corporation operates a private laboratory northeast of Hamilton and is planning to expand the facility beginning in 2003. This expanded facility will receive water from CHDPW. CHDPW anticipates the Corixa facility will require an average of 50,000 gallons per day (35 gpm) of water from the system (Lowry 2003).

The total increased water usage from the Integrated Research Facility, new households (irrigation and non-irrigation), and Corixa's facility is estimated at 539,628 gallons per day, or 374 gallons per minute. This would increase CHDPW current distribution of water by approximately 8.5 percent, and exceed the current availability of municipal system (226 gpm). However, the potential cumulative effects on the Hamilton Water System are tempered by planned upgrades to the municipal water supply to offset anticipated increases in demand for water. CHDPW plans to bring three new water supply wells on-line to supply an additional 2,500 gpm (Lowry 2003). They also plan to abandon two existing wells that are currently in poor condition that produce a combined 1,300 gpm. The planned upgrades to the system would provide a net gain in production capacity of about 1,200 gpm, more than the cumulative demand on the system of 374 gpm.

Several conservative assumptions were also used in estimating the cumulative demand on the system, including:

- The highest estimated influx of people (18,000 persons) to the area would occur by 2010;
- Ten percent of those relocating to Ravalli County would live in Hamilton. This was based on the current statistics at the Ravalli County Chamber of Commerce;
- Each person uses 150 gallons per day of water;
- New residents live in households with 2.45 residents each;
- Half of the households are multifamily units using minimal irrigation, and the other half are single-family dwelling residences on half-acre lots that use an average of 1,305 gallons per day to irrigate lawns;
- Irrigation season is 120 days per year; and
- Sixty percent of water produced by the system is unaccounted for, leaking out of supply lines.

The increases realized by installing new wells and repairing leaks would provide adequate capacity to supply the increased demand of RML, Corixa, and new homes.

Groundwater

If there is an increased cumulative demand on the Hamilton municipal system of 539,628 gallons per day (see estimate above), approximately 19 percent of the daily amount of groundwater available (flux) in the shallow aquifer beneath Hamilton would be used. (See calculations in Chapter 3, Section 3.8). The underlying aquifer is capable of providing a sufficient amount of groundwater for the projected cumulative demand.

Wastewater

The expanded Corixa facility would be connected to the CHDPW wastewater system (Lowry 2003). CHDPW anticipates that the Corixa facility would discharge approximately 50,000 gallons per day of effluent to the sanitary sewer system. New homes and businesses would be built in the Hamilton area that will be connected to the CHDPW wastewater system. It is possible that within this period, the current wastewater treatment plant would need to be expanded to increase the capacity to treat combined increase in effluent coming from the Proposed Action, Corixa's facility, and new home and business construction. It is also possible that CHDPW wastewater treatment plant would need to be expanded under the No Action alternative due to combined discharges of Corixa's facility and new home and business construction.

Because the solids handling capacity of the wastewater plant would be expanded, reasonably foreseeable activities are not expected to have an impact on the solids handling capacity of the plant.

4.9 UNAVOIDABLE ADVERSE IMPACTS

Unavoidable adverse effects are undesirable effects that cannot be avoided if the Proposed Action or any alternative is implemented.

No unavoidable adverse effects have been identified from implementation of the Proposed Action.

4.10 RELATIONSHIPS BETWEEN SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

Short-term uses associated with the Proposed Action would result in construction and operation of an Integrated Research Facility on the RML campus where other laboratories and office buildings currently exist. Land where the Integrated Research Facility is proposed to be built would be obligated for the duration of the need for the laboratory structure. No action taken in the construction and operation of this facility would preclude returning the land to its current status or to another use in the future.

Continued and future research at RML would have the potential to maintain long-term productivity because of opportunities to develop vaccines, diagnostics, and treatments to control or avoid the effects of infectious disease outbreaks in the world community. Control or avoidance of these effects would result in increasing the productivity and lives of people throughout the world.

4.11 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

An irreversible commitment of resources associated with the energy (e.g., electricity, natural gas, fossil fuels) and building materials (e.g., copper wire and piping, brick, steel, concrete, glass, aluminum and other metals) used to build and operate the facility is expected to result from implementation of the Proposed Action. Commitment of these resources could not be reversed, although some materials may be recycled and reused.

An irretrievable commitment of resources would occur from the use of wood in building materials and change in land use for the Integrated Research Facility. Commitment of these resources would be reversible in the long term (beyond 100 years).

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INDEX

LIST OF AGENCIES AND ORGANIZATIONS TO WHOM THE EIS WERE SENT

Agencies and Organizations

Alberton Public Library

Anthrax Vaccine Network, Inc., Kathryn D. Hubbell, Pres.

Attorney General, State of Montana, Mike McGrath,

Bitterroot Disposal

Bitterroot Drug, Wayne A. Hedman, Owner

Bitterroot Public Library, Nansu Haynes

Bitterroot RCND

Bitterroot Valley EMS, Joe Kerr, Kendall Neff and Terri Shively

Blaine County Commissioners

Chamber of Commerce, Bob Thomas, President

City of Hamilton City Administrator, Mark Shrives

City of Hamilton Finance Officer, Dale Huhtanen

City of Hamilton Grants & Budgets, Dale E. Huhtanen

City of Hamilton Mayor

City of Hamilton Public Works, Lorin Lowry

City of Hamilton Sewer Dept

City of Hamilton Water Dept.

Coalition for a Safe Lab, Mary Wulff

CSKT, D. Fred Matt

Darby Public Library

Disaster & Emergency Services, James Greene, Administrator

Fergus County Commissioners

Flathead County Commissioners

Friends of the Bitterroot, Jim Miller

Gallatin County Commissioners

Governor of the State of Montana, Judy Martz

Granite County Commissioners

GreenPath Properties, Vicky Bohlig,

Hamilton City Council, Dayle Anderson, Mike LaSalle, Mel Monson, Carol Schwann, Jerry Steele, Claudia Williamson

Hamilton City Police, Alan Auch

Hamilton Fire Department, Buzz Greenup, Jesse Wilson

Hamilton Land Use & Planning

Hamilton Public Schools Mr. Duane Lyons, Superintendent

Heirloom Oil Portraiture, Cooper Neville

Hill County Commissioners

House District 59, Mr. Ron Stoker

House District 60, Mr. Bob Lake

Infection Control, St. Patrick Hospital, George F. Risi, MD, FACP, FIDSA, Director

Institute of Medicine and Humanities, Herbert M. Swick, MD

KLLyncoln, Inc., Karen Linsley Lyncoln

Lake County Commissioners

Lambros Real Estate, Vicky Bohlig, Broker

Lewis & Clark County Commissioners

Madison County Commissioners

Marcus Daly Hospital, John Bartos

McCone County Commissioners

MDEQ, Jan Sensibaugh

MDEQ; Permitting & Compliance Dept.

MDEQ; Planning/Prevention & Asst, Art Compton, Administrator

MDEQ; Tom Ellerhoff, Admin Officer

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Missoula Public Library

Missoulian, Michael Moore

Montana Association of Counties, Anita L. Varone, Chair

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Montana Dept of Transportation

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Pyramid Construction, Michael Helling
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Ravalli County Sheriff's Office
Ravalli County Superintendent of Schools
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Rocky Mountain Labs, Kristine Schmitt
Rocky Mountain Rider Magazine, Veronica Grainger
Roosevelt County Commissioners
Rosebud County Commissioners
Sanders County Commissioners
St. Patrick Hospital & Health Sciences Center
Sweet Grass County Commissioners
Treasure County Commissioners
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Jameson, Star
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GLOSSARY AND ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
BSC	Biological Safety Cabinet
BSL	Biological Safety Level
CDC	Centers for Disease Control
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CHDPW	City of Hamilton Department of Public Works
CLG	Community Liaison Group
dBA	Decibels, "A" Weighted Scale
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
HEPA	High Efficiency Particulate Air
HIV	Human Immunodeficiency Virus
IATA	International Air Transportation Association
KV	Kilovolt
KW	Kilowatt
MDEQ	Montana Department of Environmental Quality
MFWP	Montana Department of Fish, Wildlife and Parks
MGD	Million Gallons per Day
MMCFY	Million Cubic Feet per Year
MPR	Maximum Potential Risk
MTNHP	Montana Natural Heritage Program
NEPA	National Environmental Protection Act
NIAID	National Institute of Allergy and Infectious Diseases
NIH	National Institutes of Health
°C	Centigrade
°F	Fahrenheit
OD	Office of the Director
ORS	Office of Research Services
OSHA	Occupational Safety and Health Administration
PSD	Prevention of Significant Deterioration
RML	Rocky Mountain Laboratories

SARS	Severe Acute Respiratory Syndrome
SHPO	State Historic Preservation Office
SVOC	Semi-Volatile Organic Compound
TMDL	Total Maximum Daily Load
USDHHS	United States Department of Health and Human Services
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Services
VOC	Volatile Organic Compound

Action Area – As defined by the US Fish and Wildlife Service, all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. This term is used in this EIS only for Threatened and Endangered Species.

Aerosol – a suspension of fine solid or liquid particles in gas (smoke, fog, and mist).

Affected Environment – the conditions of the area to be affected or created by the alternatives under consideration.

Alkaline Hydrolysis Process Tissue Digester - a process where strong chemical solutions and high temperatures are used to dissolve and sterilize animal tissue.

Allergic – having an abnormal reaction to environmental substances.

Alluvium - clay, silt, sand, gravel, or similar material deposited by running water.

Amino Acid - the chief components of proteins synthesized by living cells or are essential components of the diet.

Antigenic – Ability to be recognized by antibodies.

Aquifer - water-bearing layers of permeable rock, sand, or gravel.

Autoclave - an apparatus using superheated steam under high pressure for sterilization.

Bacteriology – the study of bacteria.

Biodefense – measures taken or planned to provide safety and security against biohazards.

Biohazard – containing material that may cause illness or disease.

Biological Safety Cabinet (Class II, type A or type B) – Equipment designed as a primary means of containment developed to provide personnel, product and environmental protection while working with infectious microorganisms.

Biological weapon – any material that can be deliberately distributed to cause illness or death by disease.

Bioterrorism – the use of microorganisms that cause human disease, or of toxins derived from them, to harm people or to elicit widespread fear or intimidation of society for political or ideological goals.

Carbonate - a salt or ester of acid containing carbon.

Chemical Shower – a sealed shower stall in which biological decontamination of a positive pressure personnel suit is performed, using a chemical decontaminant.

Communicable Period – The time during which and infections agent may be transferred directly from an infected person to another uninfected person.

Community Stakeholders – people in the community who are able to influence public opinion or who may be impacted by the proposed activities.

Connected Actions - are closely related and 1) automatically trigger other actions, 2) could not or would not proceed unless other actions are taken previously or simultaneously, and 3) are interdependent parts of a larger action and depend on the larger action for their justification.

Containment - describing safe methods for handling, managing, and maintaining infectious materials in the laboratory environment. The purpose of containment is to reduce or eliminate exposure of laboratory workers, other persons, and the outside environment to potentially hazardous agents.

Council on Environmental Quality – Established by Congress under the Executive Office of the President to oversee the National Environmental Policy Act (NEPA) to ensure that federal agencies meet their obligations under NEPA.

Cumulative Effects – impacts which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Decontamination – the process of removing harmful substances (biological, chemical or nuclear).

Direct Effect – effects which are caused by the action and occur at the same time and place.

Drug-Resistant – microbes that are able to survive medication normally used to fight them.

Emerging infectious disease –A previously unknown infectious disease, or an infectious disease new to a particular location.

Endemic – A disease that occurs continuously in a particular population.

Environmental Justice - Avoiding disproportionately high and adverse human health or environmental impacts on minority and low-income populations.

Epidemiology - branch of medical science that deals with the incidence, distribution, and control of disease in a population.

Etiologic Agent – the cause or origin of an infectious disease.

Exotic agent – Pathogens or microbes not naturally occurring in a given location.

Fair Market Value - a price at which both buyers and sellers are willing to do business.

Fauna – animal life.

Host - a living insect, animal or plant providing subsistence to a parasite

Immune Response – a natural response within the human body that occurs when a foreign molecule is detected and rendered harmless.

Immunization – a process by which medical therapy creates natural resistance within the human body .

Immunologic – pertaining to the immune system.

Immunology – study of the immune system and its responses to foreign molecules.

Incubation Period – The time interval between infection and the appearance of the first sign or symptom of the disease.

Indigenous Agent – naturally occurring in a given location.

Indirect Effects –impacts caused by an action that are not directly attributable, but instead, evolve over time.
Infectious – A microbe or pathogen able to cause disease.

Infectious Agent – Pathogens or microbes able to cause disease.

Infectious Disease – and illness caused by microorganisms that can be spread from one person to another.

Ingestion –entry into body through swallowing. Intramural Laboratory – laboratories located on federal land assigned to the National Institute of Health and staffed by federal scientists.

Irreversible Commitment of Resources – those that cannot be reversed, except perhaps in the extreme long term. Examples included species extinction, permanent removal of minerals.

Irretrievable Commitment of Resources – those that are lost for a period.

Labor income - income from work or earnings.

Life-Threatening Disease – illness that may cause one to die.

Lipids - the principal structural components of living cells,. Low-income population - refers to a community in which 25% or more of the population is characterized as living in poverty, as determined by statistical poverty thresholds used by the U.S.

Microbe – microorganism.

Microorganism – a microscopic organism. Those of medical concern interest include bacteria, viruses, fungi, and protozoa.

Minority Population - refers to an area where minority individuals comprise 25% or more of the population. Minorities are people who classified themselves as African Americans, Asian or Pacific Islanders, American Indians, Hispanics of any race or origin, or other non-White races.

Mitigation – measures taken or planned to reduce or avoid impacts.

Monitoring – repeated measurement taken to ascertain effects, document compliance or effectiveness of protection measures.

Mucous Membrane – thin layer of skin that secretes mucous.

Negative Pressure – a term used when describing controlled, interior air flow that identifies a space that has lower air pressure from adjacent spaces.

Nucleic Acids - any of various acids (as DNA or RNA) that are composed of nucleotide chains.

Pathogen – a microscopic organism that causes infection and/or disease.

Pathogenesis – the mechanism by which an infectious agent leads to disease or clinical illness.

Peptides -A short chain of amino acids, usually a segment of a larger protein.

Per Capita Income - all personal income divided by total population.

Percutaneous Injury – cut or puncture of the skin.

Personal Income - all income received by individuals from all sources.

Positive Pressure –a term used when describing controlled, interior air flow from a higher air pressure space to an adjacent lower air pressure space. .

Positive Pressure Personnel Suit – A containment suit worn for protection in a Biological Safety Level 4 environment that maintains positive pressure throughout air line supplied breathing air.

Poverty - having an income below what is necessary for basic necessities – adequate housing, food, transportation, energy, health care, etc.

Preferred Alternative – the alternative that the agency is currently considering selecting.

Primary Containment -protection measures from exposure to infectious agents for personnel within the immediate laboratory environment. .

Prions - a protein particle that lacks nucleic acid and is believed to be the cause of various infectious diseases of the nervous system (as bovine spongiform encephalopathy and Creutzfeldt-Jakob disease).

Proposed Action – the activities initially described to meet the purpose and need.

Proximity Reader System – a security device that reads a card held near it to verify is access is authorized.

Reasonably Foreseeable Action – activities that are planned, which will occur in the near future, yet are not part of the Proposed Action.

Reemerging Infectious Diseases – illnesses that have been previously identified and largely controlled that have recently become more active in the human population.

Reservoir of Infection – Any animal, plant, plant, soil, or substance (or combination) in which the infectious agent normally lives and multiplies; and serves as a source of infection.

Riparian Areas – areas near water (streams, rivers, lakes, wetlands).

Salmonid – from the family *Salmonidae* (such as salmon and trout).

Sanitary Sewer – system to remove and sanitize waste and wastewater before discharge.

Scope – the range of topics considered within the environmental impact statement.

Secondary Barriers - separation between primary containment areas and non-containment areas within a laboratory facility.

Secondary Containment - provides protection of the environment external to the laboratory from exposure to infectious materials, and is provided by a combination of facility design and operational practices.

Seismic - of, subject to, or caused by an earthquake or relating to an earth vibration.

Serologic Surveillance Program – regular blood testing for exposure to agents.

Sharps – objects capable of causing punctures or cuts, which may be contaminated.

Spirochetal Relapsing Fevers – a variable, acute, epidemic disease marked by recurring high fever, usually lasting 3 to 7 days caused by slender, spirally-undulating bacteria, transmitted by the bites of lice and ticks.

Tissue Culture – the process of growing live cells outside the body for study purposes.

Transmission – mechanism by which an infectious agent is spread from source a person.

Unavoidable Adverse Effects – adverse effect that can not be avoided if the proposed action is implemented.

Wetlands - areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas.